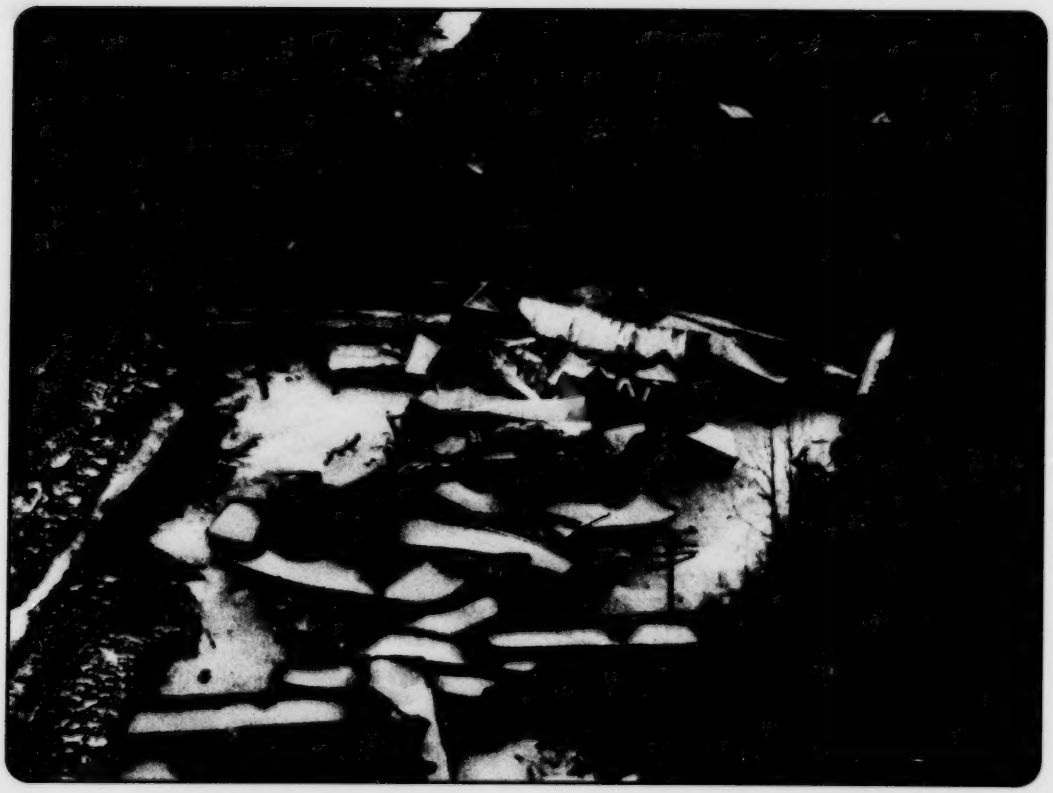
CANADA

COMMISSION OF INQUIRY
HINTON TRAIN COLLISION

REPORT OF THE COMMISSIONER
THE HONOURABLE MR. JUSTICE RENÉ P. FOISY
DECEMBER, 1986



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COMMISSION OF INQUIRY
HINTON TRAIN COLLISION

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TO HER EXCELLENCY
THE GOVERNOR GENERAL IN COUNCIL

MAY IT PLEASE YOUR EXCELLENCY

I, the Commissioner appointed by Order in Council dated 10th February 1986 as revised and amended on 26th June 1986 to inquire into and report upon the specific circumstances, reasons and causes for the Hinton Train Collision on the 8th February 1986; the adequacy of federal law, regulation, and standards and the adequacy of railway practices, procedures and standards, all as they relate to safe railway operations and this collision; and to offer recommendations for changes and reforms in railway operations that will reduce the risk of future mishaps and contribute to overall rail safety in Canada and as more specifically set forth in the said Order in Council as revised and amended: Beg to submit to your Excellency this Report.

Rene P. Foisy
Commissioner

December, 1986

Canada

REPORT OF THE COMMISSION OF INQUIRY INTO THE HINTON TRAIN COLLISION

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REPORT OF THE COMMISSION OF INQUIRY
HINTON RAIL COLLISION

AN OVERVIEW OF THE REPORT

Overview of the Report

I. Background

A. The Collision

On the morning of Saturday, 8 February 1986, a westbound CN Rail freight train collided with an eastbound VIA Rail passenger train on the CN main line approximately 11 miles east of Hinton Alberta.

23 people were killed in the collision. 71 others were injured seriously enough to require hospitalization or medical treatment. The value of property destroyed or damaged in the mishap was in excess of $30 million.

Investigations into the causes of the collision by CN, the Canadian Transport Commission, the R.C.M.P., and the office of the Medical Examiner, began immediately.

B. The Appointment of the Commission of Inquiry

On Monday, 10 February 1986, the Governor General-in-Council appointed the Honourable Mr. Justice René Paul Foisy of the Court of Queen's Bench of Alberta pursuant to the *Inquiries Act* to inquire into the collision, and report.

The Commission held 48 days of Public Hearings in Edmonton and 8 days in Jasper, beginning 24 March 1986 and ending on June 25. It heard from a total of 150 witnesses including the surviving crew members, passengers, officers of CN, VIA, CP, the Brotherhood of Locomotive Engineers and the United Transportation Union, medical doctors, officers of the Canadian Transport Commission (CTC), the R.C.M.P., the Medical Examiner's Office, private citizens, and several experts and advisors who the Commission either retained or otherwise invited to provide detailed information on specific subjects.

The Commission focused its work on three general areas. These were:

- identification of the specific circumstances and causes which led or contributed to the mishap on 8 February 1986;
- identification of conditions, operational systems, policies and attitudes relating to railway safety which were of significance to the circumstances of the 8 February mishap; and
- preparation of recommendations for changes and reforms in railway operations and in the regulative and other activities of the Government of Canada that will contribute to greater rail safety in Canada and reduce the risk of such collisions in future.

II. Findings

A. Main Findings: the 8 February Collision

The collision occurred because the westbound freight train (Train 413) failed to obey signals along the track calling for it to stop, and ran a switch governing its entry onto a single-track section where it came into collision with the passenger train (Train 4).

The 8 February collision and the resulting loss of life, injury, and loss of property, could have been averted if *any* of the following had occurred:

- had the Engineer of Train 413 observed and obeyed the signals displayed along the track, the train would have been stopped prior to entering the single-track section where the collision occurred, and the accident would have been avoided;
- had the trainman in the head of Train 413 observed the signals and brought them to the attention of the engineer or, in the event the engineer was incapacitated, had the trainman responded to the signals himself and braked the train, train 413 would have been stopped prior to entering the single-track section where the collision occurred, and the accident would have been avoided;
- had the conductor in the caboose of Train 413 succeeded in contacting the head of the train by radio as the train approached the signals to receive confirmation of the signal reading (railway operating rules require that the conductor contact the locomotive crew by radio to confirm approach signal readings), unless the engineer and trainman were incapacitated, they could have stopped Train 413 prior to entering the single-track section where the collision occurred, and the accident would have been avoided;
- had the conductor followed the railway's operating rules and applied the emergency brake if he was unable to make the required radio contact with the head of the train; even if both the engineer and trainman were incapacitated, Train 413 would have stopped prior to entering the single-track section where the collision occurred, and the accident would have been avoided;
- even if the engineer and trainman were both incapacitated and the conductor, for whatever reason, failed to establish radio contact with the head of the train and then failed to follow procedures and activate the braking system, if the "deadman's pedal" safety device in the locomotive been operating properly, and had the engineer's foot been removed from the pedal in sufficient time, the train would have stopped automatically, and the collision would have been avoided;
- had the lead locomotive of Train 413 been equipped with a modern "reset safety control" – a safety device which is more reliable and difficult to tamper with than the deadman's pedal – it is far more likely that Train 413 would have been stopped prior to entering the single track section where the collision occurred, and the accident would have been avoided;
- had CN had a policy of marshalling locomotives equipped with a modern reset safety control device as lead locomotives in trains, the second locomotive in Train 413, which was equipped with a reset safety control, would have been in the lead position, and it is more likely that Train 413 would have stopped prior to entering the single track section where the collision occurred, and the accident would have been avoided.

The Commission is satisfied that all the signals governing the movement of the two trains operated as designed and that nothing in the design of the system was inadequate so far as the events of 8 February are concerned.

The Commission also concludes that there was no mechanical failure in either train which could have contributed to the accident.

Although it is uncertain what effect, if any, it would have had on the severity of the collision, the Commission notes that the evidence indicated that no brakes were applied on either train prior to impact despite the fact that the trains were clearly visible to one another for some seconds prior to the collision.

B. Main Findings: general levels of rail safety

It is the Commission's conclusion that the 8 February disaster resulted from a lack of alertness and a failure to follow established railway operating rules on the part of the CN employees involved in the operations of Train 413, and from a failure on the part of CN to install the superior safety devices in the lead locomotive of Train 413.

The Commission has found no reason to suppose that these were isolated circumstances within the context of the operations of the railway system.

Rather, the Commission believes that the style of operations and the culture of the "railroader", as it has evolved within CN, creates an environment in which otherwise well motivated and responsible people throughout the company place inadequate priority on safety and, in effect, give tacit acceptance to rules violations that affect the safety of CN's rail operations.

Within this culture, rules and procedures intended and developed to ensure the safe and prudent operations of the system have become "background" and ritual, with the result that CN management and its partner in the definition of work environments and conditions – organized labour – fail to place proper or effective emphasis on safety.

This attitude is reflected in measures related to the development, proving, and installation of safety technology, both by the railway and the CTC. There is insufficient priority given to safety technology or to its orderly and effective implementation throughout the system.

It is the opinion of the Commission that the legislative and regulatory environment within which the railway system operates, including the supervisory activities of the CTC, the process whereby regulations are promulgated and enforced, and the effectiveness and rigour with which the CTC moves to correct identified problems, is inadequate.

III. Discussion: the 8 February collision

The Commission concludes that human error did contribute in large part to this mishap, and that management shares in the responsibility for the conditions that contributed to the human errors involved in this case. The Commission looked carefully at the condition, background, and circumstances of the crew members.

A. Crew Fatigue

All three of the crew members of Train 413 were certainly fatigued at the time of the accident.

- Evidence put before the Commission indicates that the running crew of Train 413 had little rest during the lay-over at Edson prior to taking control of Train 413; at most Engineer Hudson slept 3 1/2 hours, Trainman Edwards 5 hours, and Conductor Smith 4 hours during this lay-over.
- Ergonomic and other evidence put before the Commission indicated that the long and irregular shifts worked by running crews, the monotonous nature of much of their work, and the working conditions to which they were exposed contributed to the risk of crew fatigue.

In the Commission's opinion, crew fatigue contributed to the series of human errors that, in turn, contributed to the 8 February collision.

B. The Health of the Crew

The Commission also inquired into the health of the three crew members. Personnel and health records indicated that Conductor Smith and Trainman Edwards had no unusual health problems, although Trainman Edwards was reported to have been suffering from "a touch of the flu" and to have stated that he needed a good night's sleep when he reported for duty at Jasper on the evening of 7 February.

Engineer Hudson, however, did suffer from a number of medical conditions that could have affected his ability to perform his duties or contributed to the causes of the 8 February collision.

- Hudson was diagnosed as suffering from high blood pressure in 1976; this problem was again identified in 1980. He was not receiving treatment for this condition and there is no reason to believe that it was not still a problem at the time of the accident.
- Hudson had been diagnosed as an alcoholic in 1982. He was compelled to seek treatment for this condition in late 1984, with the treatments occurring in January and February of 1985. Evidence put before the Commission indicated that he had experienced continuing difficulties with alcohol as late as January 1986.
- In July 1985, it was determined that Hudson had diabetes. This condition could be normalized through control of diet but, at the time of his last medical examination in January 1986 his diabetes was not under control.
- In July 1985, he had had surgery to correct interruption of blood supply to the large bowel resulting from pancreatitis. At the time of the accident he was still reliant on a colostomy.
- He had booked off work for health, or other reasons, for a total of 44 days between January 1985 and 15 January 1986, and had taken a total of 26 days in vacation, in addition to an extended sick leave of 107 consecutive days in July – October 1985.
- Medical evidence indicates that, at the time of the collision there was no alcohol or drug in Hudson's system.
- Although there is no direct medical evidence to suggest that Hudson suffered heart attack, stroke, or any other catastrophic health event which disabled him prior to the collision, in light of his medical history, the Commission is unable to discount this possibility.

There was no adequate program of medical supervision or support provided for Hudson by CN management. He was returned to full duties with no restrictions although his health problems were well known to management and although there was a significant possibility that one or more of the conditions from which he suffered could at any time affect his ability to perform his duties in a safe and effective manner.

The Commission concludes that the poor overall state of Engineer Hudson's health may have contributed to the events leading to the 8 February collision.

C. Crew Performance History

The Commission also concerned itself with the employment and performance history of the crew members of Train 413.

The employment records of Trainman Edwards and Conductor Smith revealed no particular area of concern related to safety of operations.

Engineer Hudson's personnel records did reveal a variety of performance and rules violations.

- In September 1983, Engineer Hudson had accumulated 50 demerit points; when an employee accumulates 60 such points, he is automatically dismissed. He was interviewed by management at that time and warned that further violations would result in his dismissal. Subsequent to this interview, his records show other violations but no further demerit points were assessed.

Despite this record of repeated performance violations, evidence put before the Commission indicated that CN failed to take appropriate measures to provide the supervision and discipline that Hudson's performance clearly demanded.

The Commission finds this inexplicable, particularly in light of the fact that, during this period, Hudson's alcoholism was known to CN management.

D. Safety Technology

The Commission also addressed the role that available safety devices played in contributing to the accident.

- There are two different safety devices used in CN's fleet of locomotives: the traditional "deadman's pedal" and the more modern and effective "reset safety control" (RSC); both these devices operate to stop the train automatically should the engineer become incapacitated. At the time of the accident, CN was involved in a long term program of replacing deadman's pedals with RSCs throughout its fleet.
- CN's policy, by agreement with the Brotherhood of Locomotive Engineers, was to select as lead locomotives those units equipped with "comfort cabs" regardless of which of the two safety devices was installed; CN did not, however, have a policy of installing reset safety controls first in comfort cab equipped locomotives.
- The lead locomotive of Train 413 was equipped only with a deadman's pedal safety device. Evidence put before the Commission indicated clearly that these safety devices are routinely disabled by running crews. The second locomotive in the train was equipped with the more modern and effective reset safety control.

The Commission has concluded that the absence of a policy giving priority to the installation of reset safety controls, and the absence of a policy regulating the deployment of locomotives such that lead locomotives have reset safety controls, is a factor contributing to the cause of this collision.

IV. Discussion: general levels of rail safety

The Commission is concerned that general levels of safety throughout the Canadian railway system are adversely affected by the attitude, or culture, of the railroader that exists within CN, by the approaches taken to the development and deployment of safety related technology, and by deficiencies in the regulatory environment within which the railway operates.

A. The Railroader Culture

Evidence presented to the Commission led to the conclusion that neither employees nor management within CN place appropriate weight on the observance of rules established to promote safe operations.

Notwithstanding the fact that crew members and union spokesmen who testified before the Commission stated that they appreciated the fundamental importance of the rules to the safe operations of trains, examinations by a CTC official of the statements and testimony of only those running crews involved in the movement of trains in the region of the collision on the morning of 8 February revealed 19 different possible rule violations. Many of these occurred in a way that was visible to other employees, but that did not seem to raise any concern.

Similarly, although CN management professed a deep regard for safety, evidence indicated that long-standing rule violations occurred routinely without management intervention. An example was the common practice of changing train crews "on the fly" at Edson – a practice of which the responsible CN managers claimed to have no knowledge. In addition, in at least one case, management made significant changes to a fundamental operational safety rule without sufficient regard for the safety implications of the change.

This disregard for safety is a reflection of the railroader culture. Within this culture, great value is placed on loyalty, on endurance, and on productivity. An employee gains standing by being willing to work very long hours regardless of fatigue; he would lose standing by claiming a rest period. He gains standing by "protecting" a fellow employee by failing to report rules violations or health or other problems that could adversely affect performance; he would lose standing by drawing such elements to the attention of management and demanding help or support for his co-worker.

B. Hours of Work

This disregard for key safety factors is institutionalized in several aspects of the relationship between management and labour within CN.

Railway running crews are exempt from regulatory limits on hours of work.

The work scheduling and pay system for running crews that has evolved within the railway has built-in features that contribute to crew fatigue, and that can provide incentives for crew members to work very long shifts.

Although this problem was drawn to the railways' attention in 1972 by the Gallagher Inquiry into the exemption granted the railway under the Canadian Labour Code, no measures have been taken to correct this situation.

In testimony before the Commission, CN management indicated that it was not commercially practical for the company to move to patterns of work scheduling that would provide more regular and predictable hours of work, notwithstanding the fact that other industries, including railways in other jurisdictions, have been able to do so, and notwithstanding the fact that CN already manages far more complex planning and scheduling operations relating to loads and rolling stock.

The Commission is also of the view that there are disincentives to crew members "booking rest" at away-from-home terminals (although they are technically permitted to do so). All crew members, except for the engineer, are required to take rest whenever a single crew member requests it, causing inconvenience and possible resentment among other crew members.

This same railroader culture is reflected in CN's failure to have established adequate procedures to ensure that crew members are sufficiently rested to perform their duties properly. The company's policy is that the employee is the only judge of his condition. In the CN environment, this policy operates in effect to absolve management of any responsibility for

ensuring that workers are reasonably fit to perform their duties safely and well. CN contents itself with extracting an assertion from the employee that he is fit to perform his duties, rather than meeting its management responsibility to create an environment in which it will be probable that employees will be adequately rested. The Commission notes that the railway unions have taken no action to correct this abdication of management responsibility.

C. Management Supervision

The Commission was shocked by the failure of CN to provide appropriate medical or supervisory support or response in the case of Engineer Hudson, although management and the medical staff had all the information necessary to determine that the ability of this employee to perform his duties in a safe and effective manner had clearly been at risk for a prolonged period of time.

The Commission believes that this is not an isolated case, but rather that it is indicative of management attitude and of the culture of the organization generally.

The Commission further notes the failure of the unions purporting to represent the interests of CN employees to demand such support for their members. Rather, union members who were witnesses before the Commission went out of their way to attest to the fact that Hudson was a "top notch engineer" and a "100 percenter".

This kind of loyalty to a fellow worker is fully within the railroader culture. In the Commission's view, it is unfortunate that this culture did not also generate the kind of loyalty that would have demanded that, in light of his health and other problems, Hudson receive special medical or supervisory support from his employer – demands that may have averted the 8 February disaster and Hudson's own death as well as those of 22 other people.

D. Disciplinary Policies

The Commission notes management's decision to place a letter of reprimand on Hudson's personnel file rather than assessing him with additional demerit points when he was caught speeding in August 1984 at a time when such action could have led to his dismissal. This kind of consideration for an undoubtedly loyal employee is fully within the railroader culture. In the Commission's view, it is unfortunate that this culture did not also generate the kind of consideration that would have led management to take special supervisory steps to help Hudson improve his performance, especially in light of the knowledge management then had of his related health problems.

This is not uncharacteristic of the sense of "fairness" as it exists within the railroader culture. At CN, for example, "first offenses" are normally not recorded on an employee's personnel file. When such offenses are not recorded it is, in the Commission's view, problematic whether or not any offense will ever be identified as a "second offense".

Within the context of the kind of loyalty among employees that marks the railroader culture, this approach makes it very possible that consistent breaches of the rules or safety related performance problems will go unidentified and unremedied.

In short, the Commission is of the view that, within the railroader culture that has grown up within CN, both management and labour tend to resist change and to persist in established patterns of operation without adequate sensitivity to the safety implications of the practices within the railway over the years.

E. Safety Technology

This disregard of safety is apparent in the inappropriate development and deployment of technology related to safety within CN, and especially in the program to replace deadman's pedals with reset safety controls.

- CN and the CTC have long been aware of the inadequacies of the deadman's pedal. This device requires that the engineer keep his foot on the pedal at all times; if the pressure of the foot is removed, the train's braking system is automatically engaged.
- Evidence received by the Commission indicated clearly that engineers routinely disable this safety device (disabling the deadman's pedal is as simple as placing a weight on it other than the engineer's foot), and this practice has long been known to employees, unions, management, and the CTC, without appropriate remedial action having been taken by any of them.
- CN was involved in the development of the more sophisticated and effective reset safety control technology. This device requires that the engineer touch one of the six main control systems in the cab, or press a reset button on the console at regular intervals. If the engineer does not do so, a light blinks and an alarm sounds in the locomotive. If he still fails to reset the system, the train's brake system is automatically activated. The reset safety control is much more difficult to tamper with or disable than the deadman's pedal.
- At the time of the collison, CN had a program of installing reset safety controls in all of its locomotives. The pace of this program was inexplicably slow in light of the knowledge both CN and the CTC had of the inadequacies of the deadman's pedal. Further, the failure to install reset safety controls first in locomotives equipped with comfort cabs (which were marshalled as lead locomotives when available), or to establish a policy of marshalling locomotives with reset safety controls in the lead position, contributed to the causes of the collision.

The Commission is also concerned that CN does not use its existing and already operating communications systems with proper regard to its potential to contribute to enhanced safety. For example, there is no policy requiring the dispatcher to notify running crews of oncoming "meets", although this is sometimes done and witnesses testified that it would be useful. CN expressed a concern that running crews would become overly reliant on such information and relax their levels of vigilance. The Commission is satisfied that this concern is unfounded.

F. Advanced Train Control System Technology

Much of the work of railroaders is inherently boring and monotonous, making it perilous in any event to rely solely on the alertness of running crews to avert mishaps. After leaving Edson, for example, Train 413 would have proceeded under full throttle at a speed of about 20 miles an hour for approximately one hour, forty minutes to the top of the grade at Obed Summit. The crew had virtually nothing to do except look at a section of track they had seen many times before, at a time when all of the crew members were fatigued. This is in an environment that was noisy, hot, and poorly ventilated.

The main safety devices currently in use, the deadman's pedal and the reset safety control, are focused and dependent on the human factor: the behaviour, judgement and activities of running crew members.

Emerging remote train intervention and enforcement technologies are not dependent on the behaviour or capacity of crew members. These systems automatically control speeds and stop trains in the event that an order is being disobeyed or an authority exceeded. The presence of such systems would render a collision like that which occurred on 8 February virtually impossible.

In the Commission's view, it is essential that such remote intervention and enforcement technology be developed and deployed on the Canadian railway system as quickly as possible.

The Commission is uncertain as to the attitude of the major railway unions to the deployment of optimum safety technology. There is no evidence that the unions have worked to ensure the timely installation of reset safety controls in locomotives, for example, despite the fact that these devices would provide greater safety for union members.

G. Regulation of Rail Operations

The Commission notes that although the railways are, in many respects, a heavily regulated industry, there has been insufficient progress made in such areas as ensuring compliance with operating rules or deploying appropriate safety technology.

- The last major revisions of the Uniform Code of Operating Rules (UCOR) authorized by the CTC, and applying to all federally regulated railway operations in Canada, occurred in 1962, although there have been some adjustments to the regulations in the interim. In addition to being obsolete, in some cases, these regulations present in an unnecessarily obscure manner what are essentially simple and straightforward requirements in a form that makes it difficult to identify the most important safety-related regulations, or even to be sure of the intent of the regulations.
- CTC spokesmen indicated to the Commission that they have attempted to produce a new version of UCOR, but that this was difficult because of the very complex and time-consuming process which must be completed in order to change regulations. While the Commission has no doubt that this process is onerous, it is impossible to accept that this fact justifies the collective failure of government, the CTC, and the railways and their unions to achieve revisions and improvement to these basic rules for a period of 24 years.

V. Remedies

A. Modifying the Railroader Culture

There is much that is admirable in the railroader culture that has evolved within CN: loyalty to the company and to one's co-workers, a willingness to work very hard and for long hours in the face of working conditions that are arduous and difficult, a sense of fairness and community, and of sharing in a proud tradition.

At the same time, however, the culture tends to be resistant to change, even to acknowledging the desirability of change. It includes several features, discussed above, that tend to promote patterns of operation and interaction that result in a lower real priority than is desirable being assigned to considerations of safety both by employees and management.

Among the most important reflections of the culture that have adverse safety impacts are:

- a pay and scheduling system that permits, and even encourages, individuals to work very long shifts, and to work when fatigued;

- an operating philosophy that makes the employee the sole judge of his fitness to perform his duties;
- patterns of reporting and monitoring performance that do not lead effectively to the identification or correction of safety-related performance problems;
- failure to provide appropopriate medical support or follow-up to employees even in cases where known health conditions raise serious questions about employees' abilities to perform their duties safely or well; and
- attitudes to safety technology that place too little emphasis on the effective and timely deployment of this technology.

While the Commission knows it is not easy to change this long-standing culture quickly, it is important that the practices that institutionalize conditions contributing to the risk of extreme crew fatigue and to the disregard of safety rules be corrected.

Measures to correct these institutionalized factors leading to unsafe practices will contribute to the development of a greater sensitivity to safety within the railroader culture. The Report contains recommendations with respect to changes the Commission believes would have this effect.

To its credit, CN has already announced that it will be undertaking measures to establish national disciplinary standards. The railway should also re-evaluate or change its basically *laissez-faire* and fraternal supervisory philosophy.

CN has also announced some improvements in the scheduling information provided to running crews to make it somewhat easier for them to predict when they will be required to work. The railway should also alter those features that permit the working of very long shifts and contribute to the risk of extreme crew fatigue.

B. The Key Role of Safety Technology

The 8 February collision would in all likelihood not have occurred had the lead locomotive of Train 413 been equipped with a modern reset safety control system rather than the obsolete deadman's pedal.

It is essential that CN move immediately to install reset safety control devices in all locomotives, and that, in the period until these installations are completed, the railway adopt a policy of marshalling locomotives that are so equipped in the lead position of all trains.

- CN has announced that it is altering its policies relating to these safety devices by agreement with its unions. Henceforth, locomotives equipped with reset safety controls will be marshalled as the lead locomotive in the train regardless of whether or not they are equipped with comfort cabs.
- Further, CN has committed itself to the installation of reset safety controls in all of its locomotives by the end of 1987.

It is important that Canadian railways proceed with the development and timely deployment of such other advanced safety technology as remote intervention and enforcement systems to increase safety and reduce reliance on the alertness of individual employees.

Building on existing remote intervention technologies, the Canadian railways have begun to make significant progress in the development of Advanced Train Control Systems technology that can vastly improve safety on the Canadian railway system.

The Commission believes that the development and deployment of these technologies should be treated as a priority by the railways; in the event that, because of financial or other considerations, the railways appear to be delaying this critical activity, government measures to ensure timely development and deployment should be put into place.

There is also a range of measures that could be made to improve the working conditions in locomotive cabs to reduce the risk of fatigue and enhance the ability of crew members to communicate with one another.

The Commission notes that, while these conditions have, from time to time, been raised by the rail unions in negotiations with the railway, and while the unions have been successful in obtaining generous wages for their members, they do not appear to have achieved comparable success in obtaining safety related working condition improvements.

This report contains recommendations relating to the timely deployment of safety technology on the Canadian railway system.

C. The Governmental Responsibility

It is essential that the regulatory role of the CTC be strengthened where necessary to ensure safe operations of the railway, and that an independent agency be established with responsibility for enforcement and investigation of all safety related standards.

The Commission recommends that this agency be provided with effective means of enforcement of safety standards, and that it adopt a policy of prosecution of railways and individuals for breaches of these standards. A system of Ministerial penalties similar to that established in the amended Aeronautics Act, in addition to conventional prosecutions through the courts, could strengthen this necessary enforcement capability. In any event, the penalties for safety-related infractions should be severe.

The Uniform Code of Operating Rules should be updated and revised immediately to ensure that these rules are both current and clearly understood by railway employees.

Regulations should be passed to limit hours of work for running crews so as to reduce the likelihood of extreme crew fatigue.

The Commission believes that the CTC should require that firm programs with schedules and accountablities be established by the railways for the development and deployment of appropriate safety technology, including remote enforcement systems, as quickly as may be feasible, and that the CTC should monitor these programs to ensure that they are completed in a timely manner.

The Report contains recommendations relating to the role of government in achieving improved safety on the Canadian railway system.

REPORT OF THE COMMISSION OF INQUIRY INTO THE HINTON TRAIN COLLISION

On the morning of Saturday, February 8, 1986 a westbound CN Rail freight train collided with an eastbound VIA Rail passenger train on the CN main line approximately 11 miles east of Hinton, Alberta.

23 people, including 7 CN employees and 16 passengers, lost their lives in the collision. Among the dead were the 2 engineers operating the passenger train and the engineer and the front-end trainman in the lead locomotive of the freight train.

Having regard to the incredible forces of the collision it is nothing short of miraculous that 95 people survived. That number includes 78 passengers, 14 passenger service crew, 2 running crew on the passenger train, and the conductor of the freight train. 71 of the survivors were physically injured in the collision, some very seriously.

The damage to running equipment and cargos was extensive. The monumental destruction discovered by those first on the scene was beyond description. Photographs which give one some appreciation of the destruction are produced within this Report.

The collision occurred on a section of single track less than one-half mile west of a lengthy section of double track. The area is hilly and heavily treed. It is sparsely populated and there are few roads. Fortuitously the collision site was only about 2 miles from the Yellowhead Highway and access was available by a secondary road leading from the highway to a narrow road running along the track and normally used by crews responsible for the maintenance of signals near the collision site.

The emergency response facilities in Hinton were called into action within minutes of the collision. With support from local industries and individuals, and from the Town of Edson and the City of Edmonton, the emergency response effort was efficient and effective.

Notwithstanding the magnitude of the disaster the emergency was under control quickly and it was possible for railway and Government officials to turn their attention to examining what had gone wrong. Investigations were initiated by CN Rail, the Canadian Transport Commission, the R.C.M.P. and the office of the Medical Examiner.

On Monday, February 10, 1986 the Governor-General-in-Council appointed the Honourable Mr. Justice René Paul Foisy of the Court of Queen's Bench of Alberta pursuant to the *Inquiries Act* to inquire into the collision and report. The Order-in-Council, which set out specific terms of reference, is reproduced in Appendix 1.

The Commission advertised its mandate across Canada seeking submissions from interested parties. Written submissions were received from a wide variety of sources and each was considered by the Commission. Some of these responses proved of extraordinary usefulness in directing the Commission's attention to matters which it might otherwise not have considered.

Public hearings were conducted commencing on March 24, 1986. There were 48 days of hearings in Edmonton and 8 days in Jasper. 6 parties were permitted to be represented throughout the hearings and to cross-examine the witnesses who appeared. These were CN Rail, the Canadian Transport Commission, VIA Rail, the Brotherhood of Locomotive Engineers (BLE), the United Transportation Union (UTU), and CP Rail. In total 150 witnesses appeared. These included the surviving crew members, several surviving passengers, officers of CN, VIA Rail, CP and the 2 Unions, operations and maintenance personnel from CN, medical doctors, officers of

the CTC, R.C.M.P. and Medical Examiner's Office, several private citizens and several advisors and experts who the Commission either retained or otherwise invited to provide detailed information on a wide variety of subjects. A list of the witnesses setting out the capacity in which they appeared forms Appendix 2.

The evidence was transcribed verbatim. During the course of the testimony 541 exhibits were admitted into evidence. The transcripts and exhibits have been lodged with the Department of Transport.

It became apparent very soon after the commencement of the public hearings that the issues into which the Commission was asked to inquire and the detail it had to attempt to absorb were such that the report deadline of May 30, 1986 which had been set by the Order-in-Council could not be met. Accordingly, that deadline was extended to December 31, 1986.

In an effort to be as thorough as possible the Commission was obliged to look at several issues in considerable detail only to discover that they did not bear the degree of significance originally thought. These matters accordingly may receive only peripheral mention in this Report. Some of them, though not within the Commission's Terms of Reference, are matters which the Commission considers to be in need of attention and they are so identified when they are mentioned.

The Commission has found it convenient to organize its report by setting out in detail that which is known about the events of February 8, 1986. This is followed by a discussion of several issues which arise from the description of the collision events including the Commission's analysis of the part, if any, that each of several factors played in the cause of the collision. Where this analysis has led the Commission to conclude that criticism is warranted, the discussion proceeds to consider recommended changes and improvements. The conclusions reached and recommendations offered by the Commission are then summarized.

I. THE CIRCUMSTANCES OF THE COLLISION

A. The Scene

1. Location of the Collision

The CN Rail time table for the Mountain Region, a page of which is Appendix 3, shows that there are 18 "stations" along the route between Edson and Jasper. These are places where some significant track feature is located – such as a siding or the commencement of a section of double track. Only one of these stations, Hinton, is a station in the sense of a depot – a place where passengers or freight might be put on or off a train.

The collision occurred a few hundred feet west of the station identified as "Dalehurst". Other stations of significance in the discussion of the collision events are Pedley, Hargwen and Medicine Lodge.

Points along the route are also identified by their distance expressed in miles from Edmonton. Dalehurst is located at Mile 173.0. which is approximately 11 miles east of the Town of Hinton, Alberta. The exact point of impact is determined to be Mile 173.13.

2. The Route Between Edson and Jasper

A map showing some of the relevant features of the route from Edson to Jasper is produced on page 18.

a) Double Track and Sidings

Of the approximately 100 miles of track between Jasper and Edson slightly more than half is double track. There are 3 double track sections, one at each end of the route, and one approximately in the middle which is 11.2 miles long. Dalehurst is located at its western end. The two tracks in this section are referred to as "the north track" and "the south track".

There are six sidings located along the single track portion of the route. The exact location and length of each siding is set out in the time table (Appendix 3).

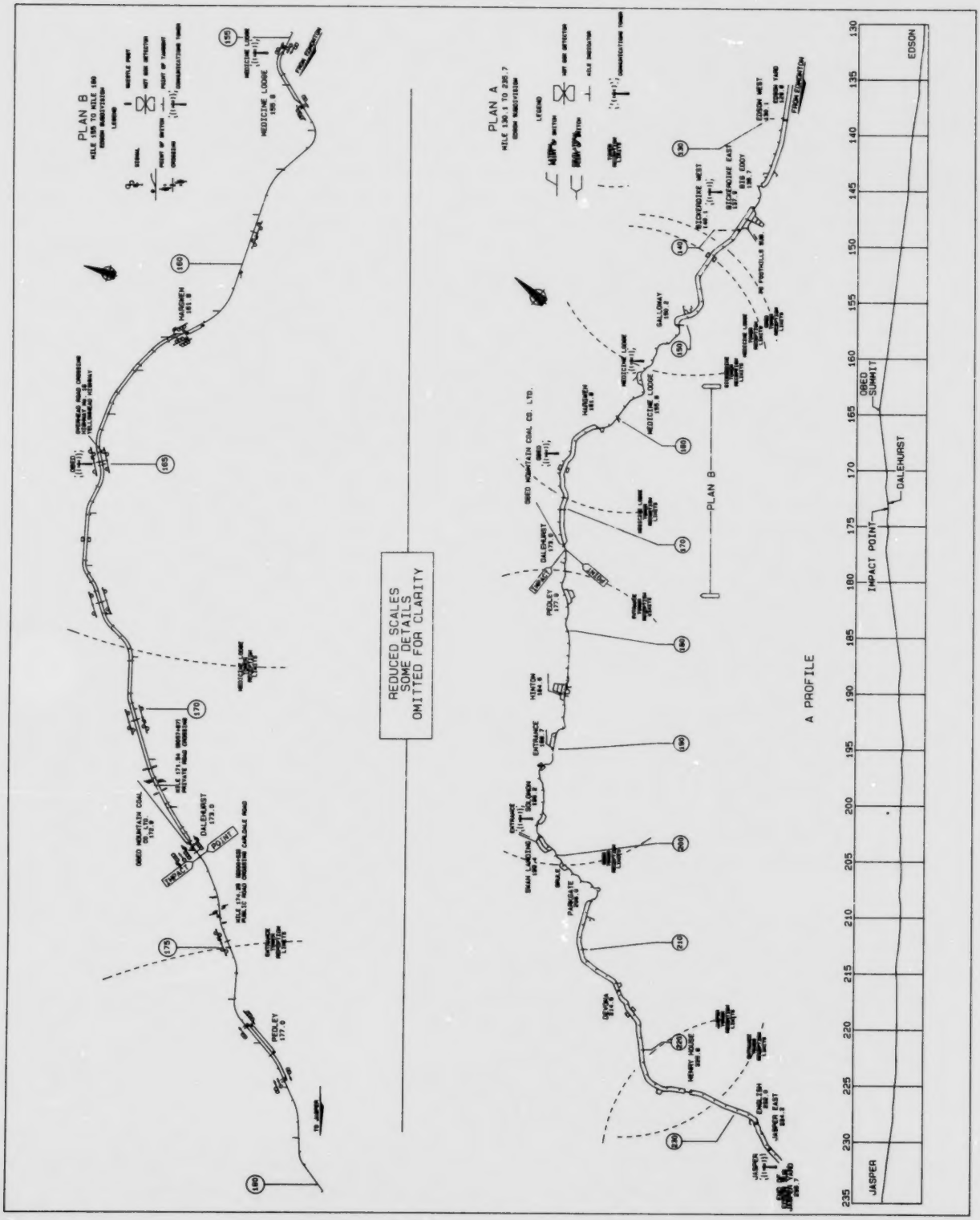
Each siding is a few hundred feet longer than the length published in the time table. This additional length is intended to provide an allowance for containing very long trains. For example, the siding at Medicine Lodge, into which Train 413 stopped on the morning of the collision, is shown in the time table as being 6,050 feet long. It is actually 6,400 feet long.

b) Grades

i) Westbound – Edson to Dalehurst

An important feature of the Edson-Jasper route is the grade encountered. It influences the abililty of crews to remain alert and affects the speed of trains. The first 35 miles proceeding west

FIGURE 1
MAP OF EDSON SUBDIVISION



from Edson is almost entirely ascending. The elevation gain is about 580 feet in that distance. The steepness of the grade over the whole ascending section averages about 0.3% and ranges as high as 0.67%. The average grade becomes generally steeper as the track proceeds west towards the point known as the Obed Summit located at Mile 164.5.

From the Obed Summit to Dalehurst there is an elevation drop of about 125 feet. The descending grade averages 0.4% over that distance. There is a one mile portion of that section where the elevation rises 5.4 feet creating a "sag or dip" which is of some significance in the evidence of the conductor of Train 413.

At the collision site itself the grade is virtually level.

ii) Eastbound – Jasper to Dalehurst

The climb to the Obed Summit for eastbound trains begins at Mile 194.5. Over the 30 miles from there east to the summit the elevation gain is about 345 feet. From Pedley to the site of the collision there is an interruption in the climb. In that 4 mile stretch the grade descends for 1.5 miles then ascends for the same distance and then is virtually level at the collision site itself.

c) Dalehurst Turnout

At Dalehurst the double track which commences 11.2 miles to the east at Hargwen becomes single track. The design of the "turnout", the junction of the double track section and the single track section, is such that moving west the north track becomes the single track. The south track curves north to join the single track.

The position of the track switch located at the junction determines to which of the double tracks the single track is lined. If the switch is lined to permit access to or egress from the south track it is lined against westerly moving traffic on the north track and is said to be "open" or "reversed". If the switch is lined to permit access to or egress from the north track it is lined against westerly moving traffic on the south track and is said to be "closed" or "normal".

d) Dalehurst Signals

i) Approaching from the East

Dalehurst is described as a "control point". This means that it is a place where trains may be stopped in the routine functioning of the traffic control system. There are, accordingly, signals located east of the point where the double track ends. These signals control westbound trains on the north and south tracks and are referred to as "home signals".

The signal for westbound trains on the north track is identified as Signal 1729N. It is located to the north of the track about 490 feet east of the turnout and consists of 3 lights in a vertical line above a triangular yellow sign bearing the letter "L", all mounted on a tall mast to create a high degree of visibility. A photograph of signal 1729N is included in the photograph section of this report.

The signal designations are derived from the location of the signals. Signal 1729N is therefore near Mile 172.9. However, the designation is not always precise. Signal 1729N is actually located at Mile 172.8.

To the east of this signal is a curve of about 1° which is to the left for westbound traffic. The line of sight of the Dalehurst home signal is not significantly affected by the curve. The evidence was that the lights of the Dalehurst home signal can first be seen from 3,300 feet east and are clearly visible from 2,900 feet east.

This home signal is the fourth of a series of signals which a westbound train would encounter in the section of double track between Hargwen and Dalehurst.

The first 2 signals in this series are called intermediate signals and are located to the north of the north track at Mile 165.0 and Mile 167.8 respectively. These each consist of one light which may display green, yellow or red. Neither is of relevance to the events of February 8 as both would have been green when Train 413 passed indicating that the train should proceed.

The third signal in this series is located at Mile 170.2 and consists of 2 lights. It is called an "approach" signal and is located 13,600 feet east of the Dalehurst signal. This signal is critical to the events of February 8.

A westbound train would encounter a 2°45' left-hand curve at Mile 169.8. The approach signal first comes into view at the start of that curve, about 2,400 feet east of the signal. The evidence was that this signal is clearly visible when it first comes into view.

ii) Approaching from the West

There is an approach signal at Mile 175.0 on the north side of the track. It consists of two lights above an "L" sign. The evidence did not indicate from what distance this approach signal would be visible to an eastbound engineer but the diagrams provided by CN indicate that the signal would become visible to an eastbound train about 2,000 feet to the east, in the course of a 2° left-hand curve.

The Dalehurst home signal governing eastbound traffic is located at Mile 173.0 on the north side of the single track. Like the westbound home signal it consists of three lights and a "L" sign.

There is a 1° curve west of this home signal. It is a left-hand curve for eastbound traffic. This curve obscures the signal until the train is about 2,000 feet west of it. From there the signal is clearly visible.

e) Hot Box Detector

At Mile 166.5, about two miles west of the Obed Summit there is a hot box and dragging equipment detector. The hot box detector measures the temperature of the axle journals of the railway rolling stock as the train passes by. The dragging equipment detector checks for the presence of any abnormal condition in the equipment such as a derailed wheel or a brake rigging hanging from the train between the rails. In addition, information regarding the time that a train passes and the speed at which it passes is recorded.

Information detected by these devices is transmitted to and recorded in the Edmonton Traffic Control office. If there is an indication of overheated bearings or of dragging equipment, the dispatcher in the Edmonton office contacts the train crew by radio.

As discussed later in this Report, the information recorded as Train 413 passed this hot box detector on February 8 was useful in determining the speed at which the train was travelling at that point.

f) Radio Towers

In several places along the route from Edson to Jasper there are radio towers which are components of the system of radio communication between the dispatch office in Edmonton and the trains. The ranges of the towers overlap to ensure that continuous communication with the dispatch office is possible from every point along the route. The site of the collision was within the range of the Obed Tower located at Mile 165 near the Obed Summit.

g) Other Features

Other features of less significance include a spur line serving the Obed Mountain Coal Company Ltd. which joins the main line 187 feet west of the Dalehurst turnout. The switch controlling access to that spur is arranged so that entry is possible only from the west. A separate signal regulates traffic on the spur. The presence of this spur near the collision site did not affect the events of the collision.

At Mile 171.5, 1.5 miles east of Dalehurst, a private road serving the Union Oil Plant of the Obed Marsh Coal Field crosses the double track. This level crossing is controlled by flashing lights, bells and gates.

At Mile 174.25, about one mile west of the collision site, there is a public level crossing. A locomotive engineer approaching this crossing is required to sound the train whistle. The crossing is protected by flashing lights and bells.

A narrow gravel road proceeds east from that crossing on the south side of the track to Dalehurst. This road provides access by CN maintenance crews to the signal and switch equipment at Dalehurst. The road proved vital to the success of the emergency response action after the collision.

3. The Weather on February 8, 1986

Environment Canada records indicate that the temperature at 0800 on February 8 at Edson was -14°C and at Jasper was -13°C. At 0900 the temperature at Edson was still -14°C and at Jasper -12°C.

There was thin and broken cloud cover. Visibility at Edson was 40 miles. At Jasper it was 25 miles. There was no wind at Edson and very light winds at Jasper. There was no fresh snow on the roadbed. Sunrise at Hinton was at about 0823 and at Obed it was at about 0822.

Some of the running crew employees who appeared before the Commission recall that the "northern lights" were particularly active before dawn. The Commission was also advised that there was a particularly severe geomagnetic storm on February 8. The relevance of this geomagnetic activity is discussed further and discounted on page 67 of this Report.

B. Train 413

Train 413 was a general freight train marshalled at the Calder yards in Edmonton from which it departed at 0155 on February 8. There was nothing unique or unusual about the equipment or the marshalling of this train.

1. Composition

Train 413 was powered by three diesel locomotives. The lead locomotive, Unit 5586, had 2,000 horsepower, and the two trailing units, Units 5104 and 5062, had 3,000 horsepower each, giving the engine consist a total capacity of 8,000 horsepower.

Behind the three locomotives of Train 413 there were marshalled 114 loaded cars and a caboose. The cars and their positions were as follows:

Positions	Description
1 – 3	Locomotives
4	High speed spreader
5 – 39	Hopper cars (grain)
40 – 46	Flat cars (dimensional loads)
47 – 91	Open top hopper cars (sulphur)
92 – 103	Tank cars (caustic soda)
104 – 111	Tank cars (ethylene dichloride)
112 – 117	Hopper cars (grain)
118	Caboose

Each of the 7 flat cars was loaded with 75,000 pounds of 78 inch diameter pipe. The dimensions of these loads were greater than standard for cars in the Mountain Region and these cars were, accordingly, referred to as "dimensional loads". Because of these loads, special train orders were issued for Train 413 giving specific instructions for the handling of the train in certain places along the route between Edmonton and Vancouver. None of these orders is of relevance to the collision.

The tank cars in positions 92 to 111 carried commodities classified as dangerous goods. The transportation of these goods is governed by Federal regulations none of which was violated in this case.

The length and weight of Train 413 was typical of trains travelling on the Mountain Region of CN. The freight consist of the train weighed 12,292 tons and was 5,932 feet long. The whole train, including the engine consist, weighed 12,804 tons and was 6,124 feet long.

2. Locomotive Cab

The layout of the cab of the lead unit of Train 413 is depicted in Figures 4 and 5. The cab was classified by CN as a "comfort cab" meaning only that it had certain features which were intended to render it more comfortable than the previous generation of cabs.

The front of the cab had a reinforced hood called a "short hood" designed to withstand a substantial collision. Access to the cab was through a door in the front of this hood. In the short hood on the engineer's side was a small toilet compartment.

3. Caboose

The caboose on Train 413 was standard equipment. Next to the back door there was a desk where the conductor would keep the documents relevant to the operation of the train including the train manifest, train orders and the documents relating to the dangerous commodities carried by that train.

In the middle of the caboose was an observation room elevated above the main roof. This room is called the cupola, and is designed to provide the conductor with a good view of the train. Access to it is provided by a ladder in the centre of the caboose. On either side of the cupola is a rotating chair. The walls of the cupola contain large windows. Between the two chairs the floor is open to the main portion of the caboose.

Located at each end of the caboose and in the cupola are gauges which show the level of air pressure in the automatic brake line. At each end and in the cupola there are also cords which when pulled effect an emergency brake application. There is also a whistle in the caboose which is designed to sound when any brake application is made. This gives the rear-end crew warning of the jerking motion that may occur at the rear-end when the train brakes are applied.

C. Train 4

1. Composition

Train 4 was marshalled as follows:

Position	Description
1	Diesel Unit 6566
2	Diesel Unit 6633
3	Baggage Car
4	Day Coach/Snack Bar
5	Dome Car/Lounge
6	Sleeper
7	Sleeper
8	Diesel Unit 6300
9	Steam Generator Car
10	Baggage Car
11	Day-Nighter, Coach
12	Cafe/Lounge Car
13	Sleeper
14	Steam Generator Car

The units in the first seven positions had formed the entirety of Train 4 on its journey from Vancouver to Jasper. The units in positions 8 through 13 inclusive had formed Train 6 from Prince Rupert to Jasper. For reasons of economy these two trains were joined in Jasper and traveled on as one train, Train 4. The locomotive of Train 6 which was in position 8 of Train 4 was not providing pulling power on the trip from Jasper. A steam generator car, unit 14, was added in Jasper and was being taken to Edmonton for servicing.

The passenger coaches, sleepers and lounges were conventional equipment. Exits were located at each end of each car.

The two locomotives at the head-end of the train were over 30 years old. Together they had a capacity of 3,250 horsepower. The layout of the cab of the lead unit is shown on page 78.

2. Passengers and Crew

At the time of the collision Train 4 was carrying 94 passengers, 14 VIA Rail passenger service personnel and 7 CN running crew employees. 9 of the VIA Rail passenger service employees had received first aid training. 1 of these was trained in the use of oxygen and in cardio-pulmonary resuscitation.

3. VIA Rail

VIA Rail is a Crown corporation created in 1977 when the Government of Canada consolidated the railway passenger services then operated by CN Rail and CP Rail. Originally, VIA Rail was responsible only for marketing operations while the 2 railways continued to operate the trains. Subsequently VIA Rail assumed ownership of all rolling stock and continued to operate on CN and CP tracks pursuant to contractual arrangements with those railways.

At the time of the collision CN (and CP on CP lines) provided their employees as running crews for VIA trains but VIA had plans to terminate this arrangement and to hire its own running crews.

D. The Crew of Train 413

1. Wayne Smith

The conductor on Train 413 was Wayne Rodney Smith. He was in the caboose at the time of the collision and survived. In February 1986 Smith was 33 years old and resided in Jasper. He first worked as a CN employee in Melville, Saskatchewan in the summer of 1971 as a yardman. In the summers of 1972 and 1973 he was a trainman.

From April 1974 on he worked throughout the year for CN in various capacities and in various places. He qualified as a conductor on April 3, 1976 and transferred to Jasper in January 1978. He worked out of Jasper from that time to February 1986 as a trainman and as a conductor.

2. Jack Hudson

The locomotive engineer on Train 413 was John Edward (Jack) Hudson. Engineer Hudson died in the collision.

Hudson was 48 years old and a resident of Jasper Alberta. He had commenced service with CN in May, 1970 as a "train engine watchman". He worked as a "hostler" in CN's Jasper yard until 1973 when he joined the running trades as a trainman. In 1976 he attended the CN training school at Gimli, Manitoba. Having completed that course of instruction and 159 tours of duty, he qualified as a locomotive engineer on March 5, 1977. All of Hudson's service with CN was out of Jasper, Alberta.

Engineer Hudson was classified as an engine service brakeman at the time of the collision. That classification is of significance only to the operation of the collective agreement – there was no restriction on his functioning as a locomotive engineer.

3. Mark Edwards

The third member of the crew of Train 413 was the front-end trainman, Mark Jenkins Edwards. Trainman Edwards also lost his life in the collision.

At the time of the collision Edwards was 25 years old and a resident of Jasper. He had joined CN as a trainman in June 1980. He qualified as a conductor in June 1982 and from that time until the collision worked out of Jasper as a trainman and conductor.

E. The Crew of Train 4

1. Mike Peleshaty

As is required on a passenger train, both of the men on the lead locomotive of Train 4 were qualified locomotive engineers. At the time of the collision the engineer at the controls is believed to have been Mike Peleshaty. Engineer Peleshaty died in the collision.

Peleshaty was 57 years old at the time of the collision. CN records show his residence to have been in Hanna, Alberta but he was working out of Jasper. He had joined CN in August 1952 as a locomotive fireman. On July 1, 1967 he qualified as a locomotive engineer and began working in that capacity in August 1969. From August 1970 to the date of the collision he worked out of Jasper.

2. Emil Miller

The second engineer on Train 4 was Emil Miller. It is believed Engineer Miller was at the controls from Jasper to Hinton. Miller was also killed in the collision.

Miller was 53 years old and a resident of Jasper. He joined CN in December 1951 as a carman and became a locomotive fireman in May 1952. He worked mostly in Hanna, Alberta until December 1983 when he transferred to Jasper as an engineer.

3. William Brownlee, Murray Guy MacMillan, Mark Tretiak

3 of the running crew members of Train 4 were positioned in the day coach which was in position 4 on the train. They were William Brownlee, the conductor, Murray Guy MacMillan, the assistant conductor, and Mark Tretiak, the baggageman. All lost their lives in the collision.

Brownlee was 59 years old and a resident of Edmonton. He had joined CN in 1947 and qualified as a conductor in 1951. MacMillan was 52 years old and a resident of Edmonton. He had worked with CN as a trainman and conductor since June 1953. Tretiak was 54 years old, a resident of Edmonton and had worked with CN as a trainman and conductor since September 1950.

4. Herbert Raymond Timpe, Nelson Quast

The other 2 members of the running crew of Train 4 were positioned in the rear passenger portion of the train and both survived the collision. They were Herbert Timpe, the assistant conductor and Nelson Quast, the rear trainman.

In February 1986 Timpe was 61 years old and a resident of Edmonton. He had worked with CN since May 1948 in various capacities including trainman, switch foreman, yardmaster, baggageman and conductor.

Quast was 51 years old at the time of the collision and resided in Edmonton. He had been with CN in a number of different capacities since August 1957.

F. Train 413 – Edson to Dalehurst

The dispatcher's Train Sheet for February 8th indicates that Train 413 departed Edson at 0640. The train had not actually stopped in Edson. It had been slowed enough to permit the incoming and outgoing crews to exchange positions while the train was still moving but had not been stopped in order to avoid the difficulty of starting up the long heavy train from a standstill on an uphill grade. This technique is referred to as "taking the train on the fly" and is a violation of the Uniform Code of Operating Rules (UCOR).

There was radio communication between Smith and Hudson as the train departed Edson. As well, Smith's evidence was that at each of the control points which the train passed, up to and including Hargwen, he and Hudson communicated the indication of the signals by radio as the rules require.

Prior to the train's arrival at Medicine Lodge, the dispatcher, Mr. Zavaduk, contacted Hudson from Edmonton. That conversation was recorded, as are all conversations between trains and dispatchers, and has been transcribed as follows:

RADIO TONE

DISPATCHER:	Dispatcher to 413, 5506 West, over . . 5586 West, over.
ENGINEER HUDSON:	Good morning, dispatcher.
DISPATCHER:	Good morning, Jack. That aw . . length of your train, there, 5932 that is the right length, is it?
ENGINEER HUDSON:	Aw, I'll get a measure at Medicine Lodge, here, I haven't had a chance, yet.
DISPATCHER:	Oh, that's aw . . . that might be a little too late . . I've got two eastbounds coming – 202 is at Hargwen and 354 is on the north track right on his ass. I'm gonna bring both over to the Lodge, there, aw . . . you've got pretty well all grain cars, eh.
ENGINEER HUDSON:	Yeah, I think so: I haven't had a chance to look at it. It's just starting to get daylight here now, I think so, yeah.

DISPATCHER: Yeah, it should be the right length, then, O.K., O.K. thanks.

At Medicine Lodge, Mile 155.8, Hudson brought Train 413 into the siding to the north of the main track to allow two eastbound trains to proceed on the main track. As Train 413 was just shorter than the siding the process of moving the train into the siding without passing the signal at the siding's west end involved careful train handling by Engineer Hudson. As the train entered the siding Smith "spotted the caboose", advising Hudson by radio of the number of cars still on the main line.

The crews of the trains which met Train 413 at Medicine Lodge saw nothing irregular about the train or its crew as they passed. Some of the crew members saw Edwards on the ground next to the locomotive observing their trains as they passed. Some saw Smith on the caboose. None of the crews saw Hudson but it would not be expected that he would have been visible given his position on the right side of the cab and the dawn visibility conditions.

The time of the arrival of each train at the various stations along the route is recorded by a computer which is used in the traffic control system. This record shows that Train 413 departed the Medicine Lodge siding at 0802:55.

Rule 3.2(b) of the CN General Operating Instructions requires a member of the rear-end crew to contact when practicable a member of the engine crew as the train approaches an approach signal to inquire as to the display of the upcoming approach signal. The crew of the train following 413 say they overheard Hudson call the signal displayed at Hargwen back to Smith.

The computer record shows that Train 413 arrived at Hargwen at 0820:47. It arrived at the hot box detector at Mile 166.5 at 0833:19.

When the caboose arrived at Mile 169, Smith says he was sitting at the back desk of the caboose and that he saw the mileboard for that mile on the north side of the train. This mileboard was the landmark which Smith said he used as a reference point to determine that it was time to call the head-end to inquire about the aspect of the Dalehurst approach signal, Signal 1703. When the caboose was at Mile 169 the head-end would be just west of Mile 170 and the approach signal would be well within the engineer's range of sight.

Smith said he made the call on his grey radio from the back desk of the caboose. He says he got no response and that he tried to reach the head-end several times on the grey radio with no success. He concluded that his grey radio was not working. He said he had no concern that anything was amiss in the locomotive. He said two things indicated to him that the train was under control; first, he thought the train was going about track speed, 50 miles per hour. Second, he said he perceived that a slight brake application was in effect.

There is no speedometer in the caboose. The conductor is trained to determine the speed of the train by clocking the lapsed time between mileboards.

There are means by which a conductor can determine whether there is a brake application in effect. The air pressure gauges will indicate any reduction in air pressure which occurs when the brakes are applied. Smith said he did not look at the air gauges at any time.

In addition the caboose whistle sounds when the brakes are applied. Smith said he does not recall hearing the caboose whistle sound at any time. Crews occasionally tie a rag around the

whistle or otherwise interfere with it so that it cannot be heard. They apparently consider the whistle bothersome. Smith said he did not examine the whistle to see if it had been rendered inoperative by a previous crew.

Smith's evidence was that when he was unable to communicate with the head-end on his grey radio, he climbed partway up the cupola ladder, turned on the red radio (he had turned it off when he left the cupola after Hargwen) and again tried to call the head-end. Again, he said he received no response.

He said he then turned the channel selector knob of the red radio to the other channels. The knob seemed to turn without clicking into other channels and Smith lost track of which channel the radio was on. His evidence is that he went through all four channels, calling on each one, and did not receive any response.

The evidence of a CN signal expert was that when the locomotive of Train 413 was approaching Signal 1703 that signal would have displayed yellow over red. According to Rule 285 of the UCOR, this is a command for the engineer to slow the train down to "medium speed", 30 miles per hour, so that he will be able to stop the train if necessary at the next signal. The rule is:

> Proceed, preparing to stop at next signal. Trains exceeding medium speed must at once reduce to that speed. Reduction to medium speed must commence before passing signal.

Smith said he recalls that when he was standing on the cupola ladder he saw the signal mast for Signal 1703 as the caboose passed it. It is immaterial that he did not see the display of the approach signal. As will be explained later when the operation of the signal system is discussed in detail, the signal would have displayed red at that time regardless of what it displayed when the locomotive approached it.

Smith stated that as the caboose was passing the signal he felt the "run-in" of slack that would result when the locomotive went up the west side of the Mile 170.5 sag or dip. Such slack action does not result from the action of the engineer, it results from the topography. Train handling can however exaggerate or reduce the extent to which the slack action is felt in the caboose. Apparently nothing about the intensity of the slack action experienced that day gave Smith any concern about whether Hudson was in control of the train.

Smith testified that having tried all the channels on the red radio unsuccessfully, he returned the setting to what he thought was Channel 1, sat down in the cupola and tried to again reach the head-end now to inquire as to the aspect of the home signal at Dalehurst. Again he received no response.

Smith said he did not hear the train whistle when the headend passed the level crossing for the Obed mine, 1.5 miles east of Dalehurst. There is a requirement that the engineer sound the whistle before that crossing. Smith said, however, that he would not expect to hear the whistle from the caboose. The RCMP interviewed people who were at the mine site that morning but could find no one who recalled seeing Train 413 or hearing the whistle.

The evidence of a CN signal expert was that when Train 413 approached the home signal, all 3 lights of that signal would have displayed red. UCOR Rule 292 states that such a signal is a command to stop.

Smith said he did not at any time pull the cord which would have caused an emergency application of the train brakes. He said that a few seconds after he sat down in the cupola the

train went into an emergency brake application and he saw a huge fire ball ahead. At that time the caboose had just passed the road to the Obed mine.

After observing the fire ball Smith said he transmitted a message of warning to the head-end – telling them that there was a big explosion, and that the front-end crew should stay away from the dangerous goods on the train.

He said he then decided to jump off the train as the caboose was still moving. He was concerned that the caboose and the dangerous commodities in front of it might travel into the fire. He got down from the cupola, stopped at the back desk to grab the train documentation and the grey radio, went to the back platform, assessed which way to jump and jumped off the caboose to the ground between the double track.

Conductor Smith's evidence is that he then tried to raise someone on his grey radio. He heard a radio tone coming from the red radio on the caboose which indicated a call coming through from the dispatcher. He ran to the caboose which by this time had stopped and spoke to the dispatcher on the red radio. That exchange was recorded and has been transcribed as follows:

RADIO TONE	
DISPATCHER:	Dispatcher to Number 4, over.
VOICE:	Hello, dispatcher.
DISPATCHER:	Dispatcher.
VOICE:	413 here dispatcher. There was ah . . a meeting here. We're just over the switch and we're all over the bush, here. I can't seem to raise the head-end.
DISPATCHER:	You mean you're derailed?
CONDUCTOR 413:	Yeah, we got a big explosion up here too dispatcher, ah. I'm about maybe 40 cars from the . . . where the smoke and everything's in the air – I saw a big cloud of . . .
VOICE:	Hello Edson West Conductor 413 ah, it looks pretty serious ahead, here. There's a lot of ah . . . fumes and stuff around here. I don't know if I should walk up. But I can't seem to get a hold of the head-end.

G. Train 4 – Jasper to Dalehurst

Train 4 departed Jasper at 0715, ten minutes late. In preparation for departure there had been a brake test which involved use of the locomotive radio. That communication was overheard by Assistant Conductor Timpe on his portable radio.

Engineer Miller had two conversations with the dispatcher in Edmonton prior to departure, one at approximately 0630 and the other at 0705. These were about routine matters and there is no indication on the transcript of anything irregular. There was no further radio contact between Train 4 and the dispatcher prior to the collision.

The trip from Jasper to Hinton was uneventful. Train 4 arrived at Hinton at 0820 and stopped to allow passengers to detrain. The train's brakes were used to bring the train to a stop at Hinton.

Engineers Miller and Peleshaty had a routine of exchanging positions in the head-end at Hinton. Because it was Miller who conversed with the dispatcher prior to departure from Jasper, it is presumed that he was at the controls from Jasper to Hinton. The positions in which the remains of the 2 men were found in the wreckage after the collision, indicate that they followed their routine on February 8. Accordingly, Peleshaty was at the controls at the time of the collision.

The train departed Hinton at 0825, five minutes behind schedule.

The 2 surviving running crew members, Timpe and Quast recall no radio communication with the head-end after Hinton.

Entries on a computer system log indicate that just about one minute after Train 4 left Hinton, the dispatcher made a request for some sort of action at Pedley, the first station west of the collision site. It cannot be determined what the request was and the dispatcher cannot recall. The computer, for a reason which also cannot be determined, would not permit the requested action to occur. The "illegal request" was followed immediately by a request to reverse (or open) the switch at Dalehurst and the record indicates that the switch opened at 0829, about 11 minutes before the collision.

This series of entries on the computer system log suggests that perhaps the dispatcher may have contemplated stopping Train 4 in the siding at Pedley and letting Train 413 pass, but that the computer would not accept that instruction. However, the records do not reveal any field condition which would have made such a request "illegal" and the dispatcher cannot recall trying to arrange the meet that way. Accordingly, this suggestion would appear to be unfounded.

Train 4 reached Pedley at 0837:15 and proceeded on to Dalehurst. The evidence of a CN signal expert is that the approach signal at Mile 175.0 would have authorized Train 4 to proceed. One of the passengers recalls observing a signal which was yellow over green shortly before the collision. If this was the approach signal, such a display is called "approach limited" and the UCOR Rule 282(a) instruction is "proceed, approaching next signal at limited speed", that is, at a speed not exceeding 45 miles per hour.

Two passengers on the Train 4 reported seeing the approaching Train 413 prior to the accident. Mr. Ken Cuttle was sitting at the front of the dome of the dome car, the fifth unit of the train. He saw the headlight of Train 413 and from the lateral swaying motion could tell that the approaching train was moving. He assumed the track was double and, accordingly, did not anticipate the collision.

The other passenger who saw Train 413 before the collision was Mr. Perry Warniski who was seated in the day coach, which was the fourth unit of the train. He did appreciate that the approaching train was on the same track as Train 4 and yelled out, "he's on our track", prior to the impact.

Mr. Cuttle also recalls seeing red signals east of the lead locomotive of Train 4. His evidence was that he saw two such red signal lights and a third red signal light to the east of the point of impact all on the north side of the track. Another passenger, Mr. Grosh, reported seeing three red lights on the north side of the track just before the collision.

Mr. John Raistrick, a CN running crew employee on holiday with his family, was in the day coach, which was in position 4 of the train, a few minutes before the collision. He had been talking

to the 3 CN crew members, Brownlee, MacMillan and Tretiak, who were in the middle of the day coach at seats designated for them. Mr. Raistrick says that the portable radios these crew members had were on. Mr. Raistrick returned to his wife and daughter in the car in the fifth position prior to the collision.

There was a requirement that the engineer sound the whistle before the public crossing at Mile 174.25. The passengers who gave evidence did not recall hearing the whistle sound although they had heard it on other occasions.

None of the witnesses on Train 4 felt any brake application prior to impact. This includes several passengers and at least three persons who might be expected to have appreciated that there was a brake application had there been one: Raistrick, and the two surviving crew members, Timpe and Quast.

Timpe and Quast had their radios turned on, monitoring Channel 1 at all times during the trip, but did not hear any radio transmissions from Train 413 prior to the collision. Timpe's evidence was that his radio was receiving properly prior to the collision and that after the collision he received transmissions from dispatch and overheard communications between Smith and dispatch clearly.

H. The Collision

From observations made by moving two locomotives gradually back in both directions from the point of impact and assuming speeds of 59 miles per hour and 49 miles per hour for Trains 413 and 4, respectively, CN prepared an analysis of the collision events. The results are depicted in Figure 3 on page 73. The validity of the assumptions used in this analysis is reviewed later.

The relevant conclusions of this exercise are that as Train 4 approached Dalehurst the permissive display on Signal 1730 would have been first visible 20.4 seconds prior to impact and clearly visible 19 seconds prior to impact.

Also, 19 seconds prior to impact, it would have been possible to see either train from the other. At that time Train 413 would still be east of the Dalehurst switch and the permissive signal would still be displayed to Train 4.

At 18 seconds before impact, Train 413's lead locomotive entered the turnout. As is explained later in this report when the signal system is described in detail, this would have the effect of breaking the signal circuit affecting Signal 1730 and causing that signal to turn to red.

According to this analysis, the two trains were on the same track for 18 seconds before the collision.

The last event recorded on any of the computer records relating to the movement of Train 413 and Train 4 is the arrival of Train 413 at Dalehurst. The time of that arrival is shown as 0840:34. The time of impact would have been about 18 seconds later.

I. The Damage

The devastation caused by the impact defies description. It is not possible to appreciate the horror that the victims of the collision experienced.

23 persons lost their lives. These included the head-end crews of both trains, 18 occupants of the day coach which was in position 4 on the train and 1 occupant of the dome car which was in position 5.

The destruction and horror caused by the impact was intensified by fire fuelled by the spilled locomotive diesel oil. The fire broke out almost immediately following the impact and engulfed the lead units of both trains, the baggage car and the day coach. The contents of a grain car which was thrown into the wreckage also spilled into the day coach. This may possibly have saved some passengers' lives by smothering the fire.

Miraculously, 18 occupants of the day coach managed to escape. Some did so despite having suffered serious injuries.

The passengers in the observation dome escaped through a broken window. The passengers on the lower level of that car escaped through a hole in the side of the car created when one of the cars of the freight train which had been thrown in the air, smashed into the rear of the dome car.

The 2 sleeper cars immediately following the dome car, units 6 and 7 of the train, were derailed and thrown onto their sides. Some of the passengers in these cars had difficulty finding a route of escape but eventually they did.

The diesel unit, steam generator unit and baggage car in positions 8, 9 and 10 of the train were derailed and overturned – the baggage car only partially. The 3 passenger cars at the rear of the train, units 11, 12 and 13, did not derail. The occupants of these cars were violently thrown about by the impact and some suffered injury.

The Commission heard accounts of remarkable heroism exhibited by passengers and VIA personnel. The number of survivors, an amazingly high number given the extent of the damage to the train equipment, indicates that there must have been many heroic acts performed that were not brought to the Commission's attention.

Photographs give a better impression of the extent of the damage and destruction than is possible through narrative. Some of these are reproduced in this Report. On Train 413 the 3 diesel locomotives, the high speed spreader, 35 grain hopper cars, 7 flat cars carrying large pipes and 33 hopper cars carrying sulphur were destroyed or damaged.

The cost to the two railways, CN and VIA, has been estimated to be in the area of $35,000,000. A breakdown of these costs appears in the following table.

TABLE 1

Estimated Costs of the Hinton Train Collision

VIA Rail Costs:

Item	$ Millions
Equipment Replacement	5.820
Equipment Repair	.202
Loss of Revenue (Long Term[1])	5.626
Allowance for Claims Settlements	7.000 – 9.000
TOTAL	18.648 – 20.648

[1] Includes revenue losses for Years 1986 – 1990.

CN Rail Costs:

Item	$ Millions
Equipment Replacement	11.262
Transportation	.404
Other[2]	2.317
TOTAL	13.983

[2] Includes engineering, police, claims services, management, overhead and task force costs.

J. Events after the Collision

One of the immediate concerns following the collision was the status of the dangerous goods carried by Train 413. Fortunately Train 413's 20 dangerous goods cars had been marshalled near the rear of the train and did not derail. The dispatcher in Edmonton instructed the engineer of the train which had been following Train 413 to stop, disconnect his locomotive units from his train, proceed to the remaining cars of Train 413, and move all cars not derailed or damaged, including the dangerous goods cars, back from the collision wreckage.

Conductor Smith and the head-end crew of that following train, Engineer C. Elliott and Trainman J. Keogan, undertook this operation but did not realize prior to pulling the cars back onto the north double track that the Dalehurst switch had been damaged by Train 413. Accordingly, when the cars were pulled back one derailed and damage was caused to the switch and track.

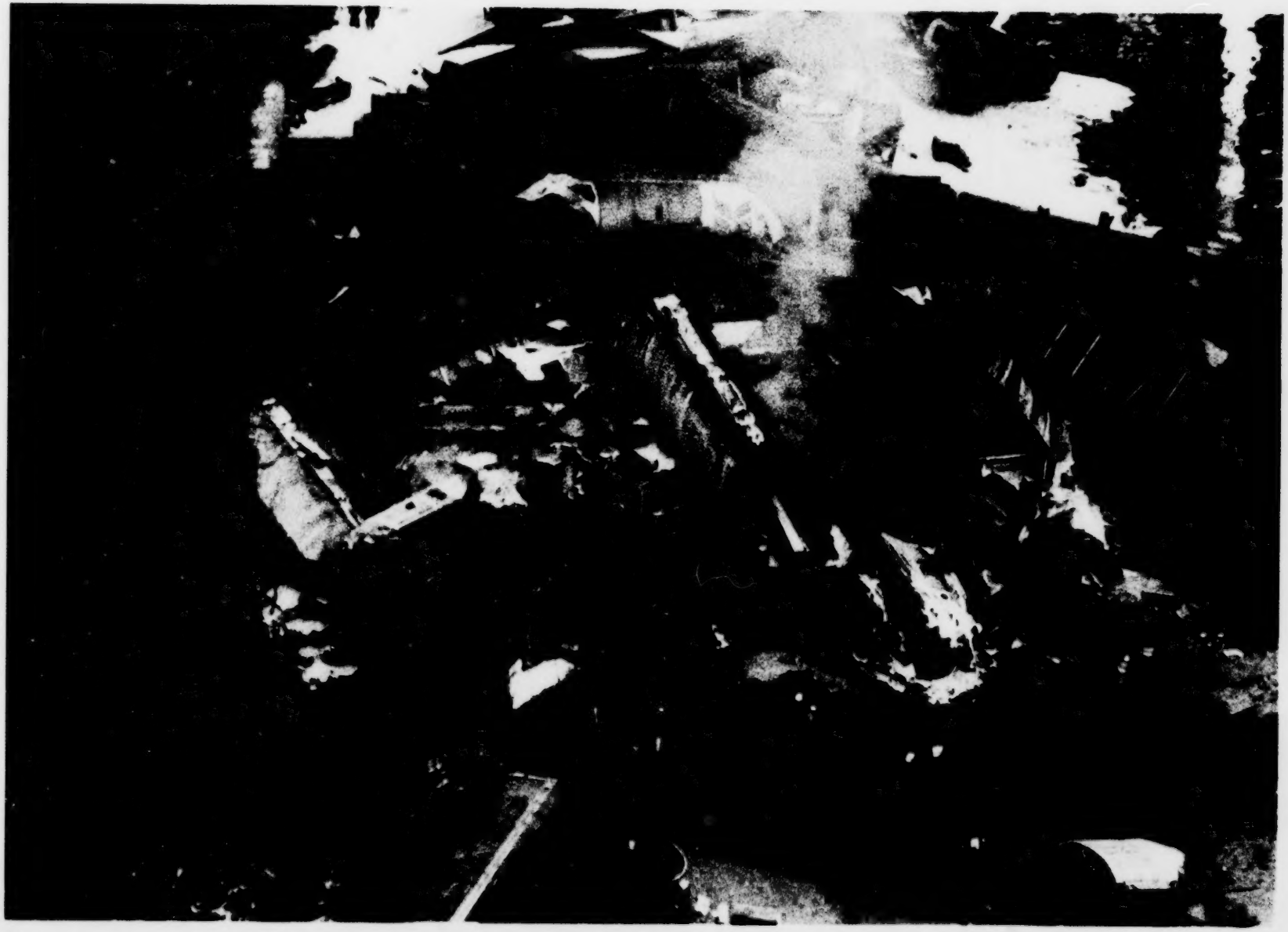


Photo I: Collision Site Looking East. Credit: The Edmonton Sun.

Photo II: Collision Site Looking East. Credit: Jim Cochrane, The Edmonton Journal.

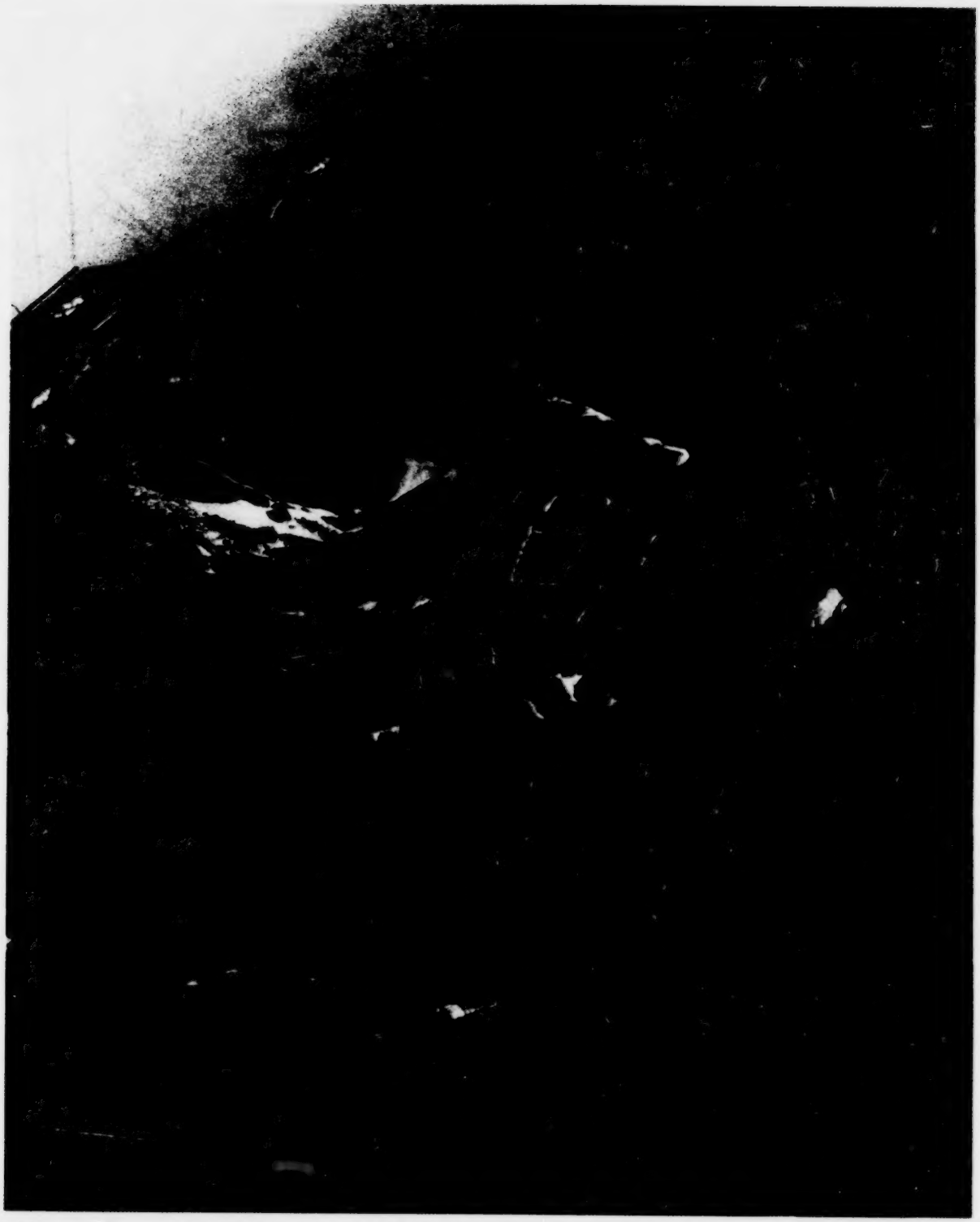


Photo III: Ground Level View of the Wreckage.

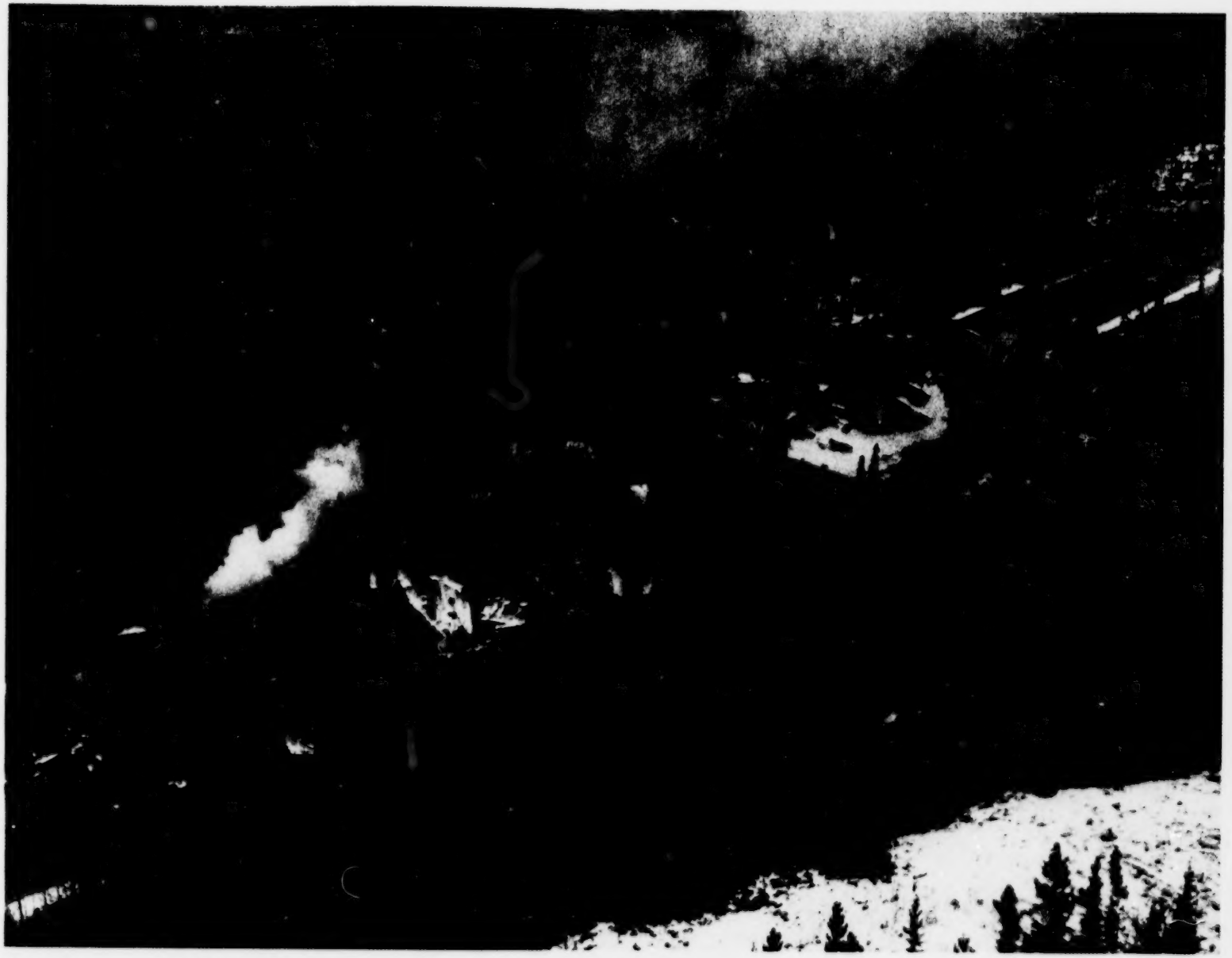


Photo IV: Collision Site Looking North.

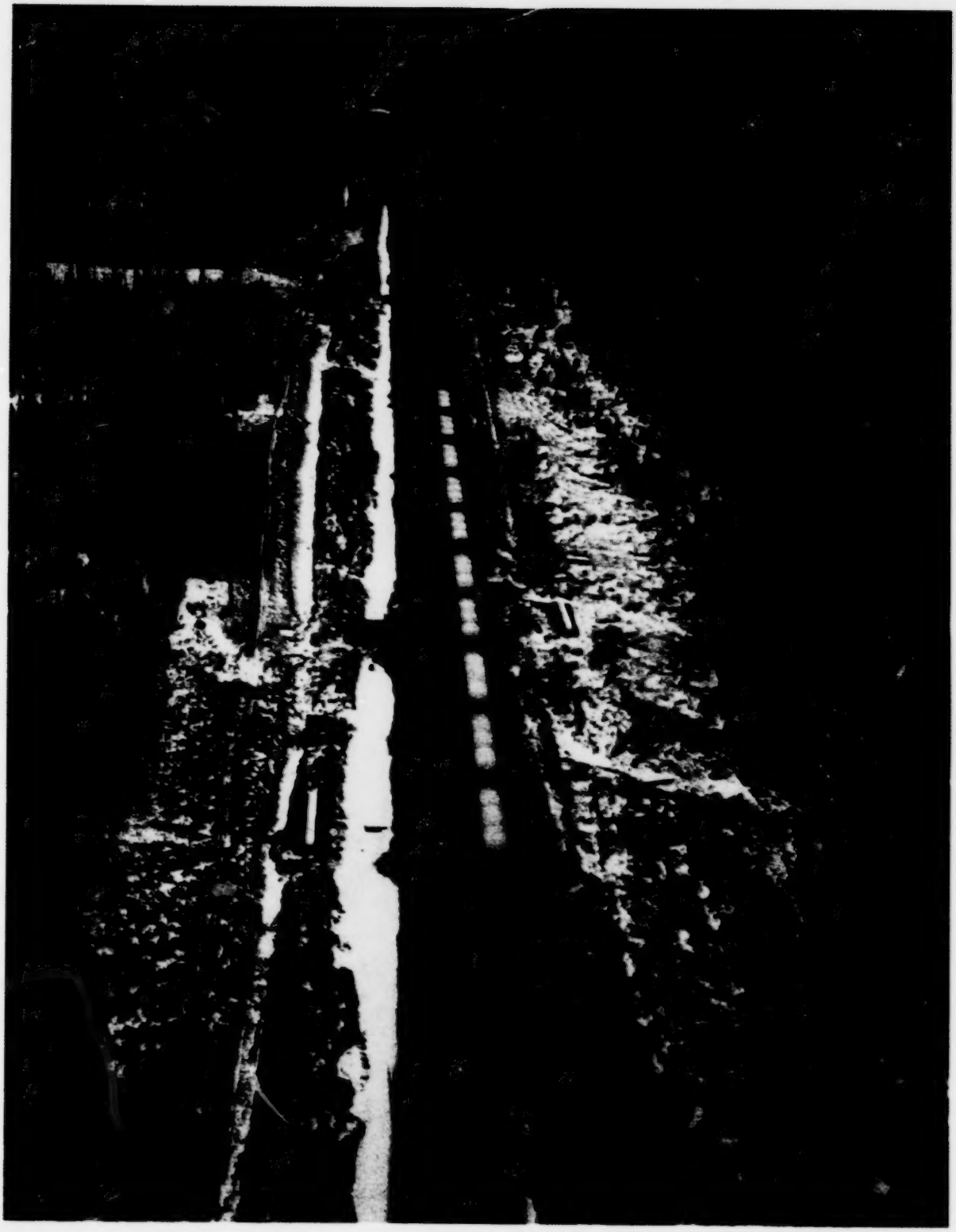


Photo V: View of Collision Site Looking West and Showing Section of Main Line Double Track in Foreground.

Photo VI: Collision Site Viewed Looking East and Showing Section of Main Line Double Track and Spur Line to the North.

Photo VII: Via Passenger Car. Credit: The Edmonton Sun.

Photo VIII: Signal 1729 N.

II. ANALYSIS AND RECOMMENDATIONS

The Commission's task was to carefully examine the available evidence to determine which of many possible factors contributed to the cause of the collision. The process involved gathering information relating to the condition and operation of all equipment involved in the movement of each train, the condition and actions of the crews in control of the trains, the operation of the system to control train traffic, the operation of the rules governing train movements, and the supervisory function of management and the government regulatory agency.

In the course of considering this information many issues arose for determination. The Commission has attempted to set out its conclusions on each issue. In several cases the conclusion is that a potential causal factor did not or probably did not contribute to the collision.

In other cases, the Commission concluded that the factor did or probably did contribute. In these instances the Commission has gone on to attempt to identify the deficiencies in the relevant system, to consider possible improvements and to make recommendations.

A. Evidence of Conductor Smith

As has been mentioned previously, the information which the Commission has used in this analysis was gathered from 150 witnesses and a very substantial number of documents. It was frequently necessary for the Commission to assess the relative weight or reliance it should place on the testimony of an individual witness. It has not been considered generally useful to set out the Commission's reasoning in deciding the degree of reliance to place on any particular evidence.

There is one exception. The Commission considers the evidence presented by Conductor Smith regarding his actions in the 10 or 15 minutes preceding the collision to be of fundamental importance to several of the issues that arose for consideration.

For example, that evidence is of significance in considering the possibilities as to what transpired at the head-end of Train 413 immediately prior to the collision.

Smith's evidence was that he initiated several radio calls to the head-end in the 3 or 4 minutes preceding the collision. If it is assumed that those transmissions were audible in the head-end, it might reasonably be expected that they would have restored the attention of Hudson or possibly Edwards if they were being inattentive.

The Conductor's evidence is also of significance to the question of the fundamental integrity of the radios, to the question of crew alertness and rest, and to the consideration of the operating rules generally, and CN General Operating Instruction 3.2(b) in particular.

Accordingly, it was particularly important to determine the degree of reliance that the Commission could place on the evidence of Conductor Smith and it is appropriate to describe in some detail the reasoning used in coming to that determination.

Smith's account of events, particularly of his attempts to contact the front-end was given within half an hour of the collision to the dispatcher by radio. That exchange has been transcribed:

DISPATCHER:	OK, ah . . . what . . . ah . . . what the . . what was the signal at Dalehurst ah . . when your head-end called it.
CONDUCTOR SMITH:	Pardon me.
DISPATCHER:	What was the indication on that ah . . signal at Dalehurst?
CONDUCTOR SMITH:	Well, I was callin' him for the signal at Dalehurst, ah quite a few times. And, ah . . . we'd been having trouble with the radio on the way down. And . . . ah . . . he never called and I felt the air set up, and ah . . you know, like he was in control of the train. And, ah . . I kept calling him and there was no answer and, ah . . . I tried on different channels eh. And, ah . . . so we could of gone through a red one, I think – he could of – I'm not sure. What was on your panel?
DISPATCHER:	Well, it should of been red on the panel.

CONDUCTOR SMITH: Well, he must have ran it dispatcher because I could not get a hold of him - I tried and tried. And I've been having trouble – like even last night coming on the way down – with the radios. And I'd . . . he just would . . you know I'd get some static on the radio and I figured he was, you know, in control of the train 'cause I felt the slack run in on the train . . . when he set em up. And then . . . the air went . . . and, ah . . . all I could see was a huge ball of fire in the air.

Several particulars of Smith's evidence have led the Commission to have doubts about its accuracy and reliability. These include:

1. The transmissions Smith says he made were not heard by Quast or Timpe in the rear of Train 4 though they had their radios on and though other evidence established that there was no reason why they would not have received such a transmission.

   It also seems unlikely that the transmissions were heard in the engine of Train 4 because if they were, it is reasonable to assume there would have been a reaction. The absence of a reaction is equally consistent with the locomotive radio not working and the possibility that the transmissions were not made.

2. Though Conductor Smith says he concluded before the collision that the grey radio was not functioning properly, when he jumped from the train he took it with him. Thereafter he made several transmissions to the dispatcher using that radio and did not seem to express any surprise that the radio was working.

3. Smith's conversation with the dispatcher after the collision referred to radios malfunctioning on the trip to Edson the previous night. This seems anomalous in that he sought no repairs or replacement for his grey radio. The other radios involved were on a different train.

4. Conductor Smith said he perceived a brake application when the front-end was at the approach signal. Other evidence suggests convincingly that there could not have been such an application.

5. Evidence which will be discussed below indicates that Conductor Smith was probably experiencing a significant sleep deficiency when he went on duty.

6. When Conductor Smith was asked about the position he had occupied in the caboose he acknowledged that shortly after his radio conversation with the head-end at the Hargwen signals, he had left the cupola and gone to the back desk of the caboose. He had remained there until shortly before the collision. Other witnesses advised that standard procedure is for the conductor to be in the cupola when his train is moving unless his duties require him to be elsewhere. Nothing about Conductor Smith's duties after Hargwen required him to be at the back desk. The possibility exists that Conductor Smith was not being attentive to his duties after Hargwen.

   This evidence is also of significance in determining credibility because when Conductor Smith gave the evidence, he originally justified his presence at the back of the caboose by noting that he had wished to be in a position to

communicate with a work crew which is often stationed near the Hargwen signals. He suggested that he had noticed work crews in that position on several of his trips in the preceding weeks. When he was advised that CN records indicate that there had been no work crews in that place for several months, he acknowledged that his real reason for going to the back of the caboose was that he simply preferred to sit there. The change in his evidence on this point when faced with a contradicting fact, aroused the Commission's concern.

7. There is an inconsistency between what Conductor Smith says he did and what he says his state of mind was in the few minutes preceding the collision. He says that he did not have any doubt that the train was under control. However, he said he had made repeated calls on the grey radio followed by repeated calls on the red radio, including calls on each of the four channels of the red radio. He said he had made the red radio calls while hanging on the bars of the steps leading to the cupola. His descriptions of his actions suggest some recognition of an urgency to the situation and yet he says he never had any concerns.

8. Accepting Smith's evidence at face value, there was a lapse of something in excess of three minutes between the time he says he received no response to his radio call and the time of the collision. This was more than ample time for him to have appreciated the significance of the situation. If he made all of the radio attempts he said he made they could not have occupied more than half that time, and it is difficult for the Commission to accept that three minutes could pass without him developing sufficient concern about the situation to take some action.

9. The day of the accident Conductor Smith was interviewed by the R.C.M.P. and in his statement to them said that he thought the front-end must have been asleep. It was obvious in his evidence to the Commission that he regretted having made that statement and his reflections after the accident resulted in him changing his mind on that speculation. However, the fact that he made that statement suggests to the Commission that the radio calls he says he made may not have been made. His statement that he thought the front-end crew was asleep was inconsistent with his statement that he had the impression that there was a brake application and that the train was under control.

It is not difficult to understand how in light of the proportions of this tragedy, Conductor Smith would rationalize events as he reflected upon his conduct. However, there are simply too many inconsistencies and difficulties with his evidence to allow the Commission to place any substantial weight on it.

B. Condition of Equipment

1. The Track

One of the first matters to which the Commission gave attention in the course of the Inquiry was the design and integrity of the track structures in the Dalehurst area.

The track in the vicinity of Dalehurst was constructed in 1982 to CN's standards for high tonnage mainline trackage. It consists of 136 lb. rail on softwood ties, with 12 inches of crushed rock ballast, on top of 12 inches of subballast which, in turn, sit on the finished subgrade.

The Dalehurst "turnout", that section of track where the single track joins the double track and in which the switch is located, is a 136 pound, No. 20, right-hand lateral turnout built to CN's standards for heavy duty mainline turnouts. Resilient fastenings attach the rail and other components to the tie plates, which are lag screwed into hardwood switch ties. The switch points are connected to, and controlled by, a power switch machine by means of the throw rod, lock rod and point detector rod.

The track and turnout were inspected on February 7 by an Inspection and Light Repair Section (IRS) foreman on a hi-rail and also by an IRS foreman travelling by train. The entire turnout had last been inspected in detail on January 30. These inspections were carried out in accordance with the CN standard practice circulars relating to track and turnout inspections. No items outside tolerance were noted.

The Commission is satisfied that nothing relating to the track design, structure or integrity contributed to the collision.

During the course of the inquiry, Commission members inspected CN's new Track Evaluation Systems (TEST) geometry test car. The advanced level of technology, which has been developed to maintain track in a safe and cost efficient manner, was impressive.

2. The Trains

The next matter considered by the Commission was the mechanical condition of the trains which collided. Was there any evidence of a mechanical deficiency which could have contributed to the collision?

a) Mechanical History of Locomotives

The Commission reviewed the documentary evidence regarding the long term maintenance and inspection of the locomotive units of Train 413 and Train 4 and is satisfied that they had received standard and proper long term maintenance.

Locomotive 5586, the lead locomotive of Train 413, had been placed in service with CN on November 10, 1973. It and the other two engines in Train 413 had CN standard quarterly, half-yearly and annual inspections and maintenance. Its last semi-annual inspection had been on December 10, 1985 and it was not due for a quarterly inspection until March 1986. The locomotive had been out of service for 156 days in late 1984 and early 1985 because of low traffic levels.

The other two locomotives of Train 413 had undergone regular inspections in December 1985 and January 1986. The evidence indicates that all required tasks were performed during these inspections.

The maintenance file for the lead locomotive of Train 4, Locomotive 6566, indicates that there had been several problems encountered with that locomotive in the several months preceding the collision. This is perhaps not surprising given that the locomotive was first placed in service in 1952. These problems included improperly opening and closing windows, fogging of windows, a speedometer malfunction, windshield leaks and a sticking throttle. The evidence presented however, including that of the engineer who brought Train 4 into Jasper on February 8, establishes that none of these items were causing difficulty on the day of the collision and, accordingly, any inadequacy in the maintenance received by that locomotive as evidenced by the existence of these difficulties, is of no relevance to the questions before the Commission.

The Commission is satisfied that nothing in the mechanical history of the maintenance of the locomotives gives cause for concern.

b) Pre-Trip Procedures – Train 413

The Commission heard evidence from several members of the crew who prepared the engine consist of Train 413 in the CN Calder yards in Edmonton. This crew was responsible for the performance of routine inspections and maintenance on 8 locomotive consists scheduled for departure on February 7 and 8. The routine procedures included inspection of all equipment and connections, as well as operational tests of the engines, brakes and related equipment, and the locomotive radio.

In their statements to CN after the collision and in their evidence before the Commission the crew members were confident that all the routine procedures they were required to perform, had in fact been performed. Their evidence was quite clearly not founded on any specific recollection of the particular consist that led Train 413. It was founded on the assumption that each crew member had followed his regular routine in the case of each of the consists on which the crew worked that night and had either encountered no mechanical deficiency or remedied any deficiency found.

There is a record kept of the tasks performed by the pre-dispatch crew on each engine consist. The record is in the form of a list of the tasks required to be performed. As each task is completed, the crew member responsible for it indicates completion of the task by signing the list in the space provided beside the task completed.

If this document had been completed properly, it would have established with greater certainty that each required task had been performed on Train 413's engine consist. Unfortunately, it was not properly completed. As the crew was particularly busy on the night of February 7, the supervisor completed the check list. It was not completed by the crew members who did the work. Accordingly, the document adds nothing to the testimony of the crew members themselves. It too was completed on the assumption that as the routine requires certain tasks to be done, they were done.

Nevertheless, given the confidence of the maintenance crew that they followed the routine and given that the running crew who operated the train from Edmonton to Edson encountered no significant irregularities in the operation of the train, it is reasonable to conclude either that the Edmonton predispatch crew performed all of the functions required or that if they missed any, the omission was immaterial.

A second crew consisting of two carmen prepared the freight consist of Train 413 for departure. This crew walked the entire length of the train inspecting the air line and looking for any unsafe condition. They applied the yard air supply to the air line and made minor adjustments to eliminate minor leaks. No major leaking was found. They also tested the functioning of the brakes by initiating a brake application and release and inspecting each car to ensure that the brake shoes had applied and released.

Final testing of Train 413 in the Edmonton Calder yards was undertaken by the running crew assigned to the movement of Train 413 from Edmonton to Edson.

This crew conducted the routine inspections and tests on the engine consist when they took charge of it prior to it being coupled to the freight consist. They then moved the engine consist to the track on which the freight consist was located, coupled the two together and with the assistance of the carmen, conducted the required brake test. As the train departed, the rear-end crew performed a roll-by inspection prior to boarding the caboose. The crew also satisfied themselves that the radios were operating properly by using them to perform these tests and inspections and in communication with the Edmonton dispatch office.

There were some deficiencies evident in the inspection procedures followed in the Calder yards. The inadequacy of the record keeping by the crew who prepared the engine consist for departure has been noted. In addition, when the running crew performed the brake test on the engine consist, there was no one on the ground observing whether or not the brakes applied. However, this deficiency is immaterial because a proper test was done after the coupling of the engine consist to the freight consist.

Also, when the engineer tested the safety control appliance, the deadman's pedal, he did not wait for a brake application to be initiated. He ended the test upon hearing the whistle blow after the pedal had been released. However a complete operational test of the safety control appliance had previously been performed by the predispatch crew and in that test the appliance operated properly. The operation of the deadman's pedal is described in detail on page 131 of this Report.

These procedural deficiencies, placed in context, do not create any doubt that Train 413 was in proper running condition when it left Edmonton.

c) Operation of Train 413 – Edmonton to Edson

Except for two matters which the Commission considers to be of very minor significance, the trip from Edmonton to Edson was uneventful and supports the conclusion that Train 413 was in sound running condition.

The first exception was described by Engineer Michel Janusz as a "lurching" of the engines when they were operating at low speed. He thought that this was caused by the two trailing locomotive units loading more quickly than the lead unit. The lurching could be eliminated by maintaining load on all engines at low speed. Accordingly, Engineer Janusz avoided using brakes to slow the train and used throttle instead. The brakes were used only twice on the entire run from Edmonton to Edson.

The second exception was that during the trip a warning bell and light indicated a problem in the second locomotive unit. Trainman Ozubko investigated and found the excitation light on the electrical panel of the second unit to be lit. He reset the isolation switch and no further difficulties were encountered on the remainder of the trip.

The Commission is satisfied that neither of these incidents indicate any significant deficiency in the mechanical condition of Train 413 and that they have no significance to the events of the collision.

The rear-end crew on the Edmonton-Edson leg of Train 413's journey advised the Commission that the caboose air pressure gauges which indicate the pressure in the brake line were working properly. They could not however remember having heard the warning whistle sound on either of the two occasions when the brakes were applied. The crew also reported that the radios on the train worked properly throughout the trip.

d) Preparation of Train 4

The forward half of Train 4 was prepared for its journey in Vancouver. The rear half which, until it arrived in Jasper was Train 6, was prepared in Prince Rupert.

The crews who prepared these trains did not testify at the Commission Hearings. The Commission received the statements that members of these crews gave to CN following the collision and was satisfied on reviewing them that all inspections and tests of any possible relevance had been conducted prior to the trains leaving for Jasper.

e) Operation of Train 4 to Jasper

The run of Train 6 (which at Jasper became part of Train 4) from Prince Rupert to Jasper was completely uneventful.

There were reports of irregularities in the operation of Train 4 from Vancouver to Jasper. There was a temporary power loss in the dining car and a passenger reported seeing smoke belching from the locomotives in the mountains and the headlight flickering erratically. The running crews however reported no significant operational irregularities other than a difficulty encountered with the locomotive radio. That matter is discussed further when the subject of radios is considered in detail.

f) Servicing of Train 4 in Jasper

Upon their arrival in Jasper, each of the passenger trains were given a roll-by inspection and a walking inspection by carmen in the Jasper yard. The trains were coupled together and the air line coupling was inspected and tested. A steam generator was coupled to the rear of the train to be taken to Edmonton for servicing.

The required brake tests were performed prior to the departure of Train 4. Minor servicing was required to thaw a frozen steam connection on one of the locomotives.

The radios were employed in the course of the various tests and were found to be working properly. The attention given to the locomotive radio in Jasper is dealt with in the specific discussion of radios which appears later in this Report, and subject only to the observations there made, the Commission is satisfied that all appropriate inspection procedures were performed on Train 4 in Jasper.

g) Inspection of Equipment after Collision

Those portions of Trains 413 and 4 which were not damaged in the collision were later inspected by CN officers and by officers of the Canadian Transport Commission. In addition, portions of the wreckage were examined, particularly, the wheels of equipment that was destroyed. Some of the observations made during these inspections are discussed later in the section of this report dealing with brakes and radios. The general conclusion reached from these inspections was that there was no evidence revealed of any mechanical malfunction which might have contributed to the cause of the collision.

One potential deficiency which would not directly have affected the collision but which is of some peripheral significance was the testing of the brake line whistle in the caboose of Train 413. Tests on this whistle were performed on more than one occasion after the collision and the whistle did not always work in those tests. It is possible therefore that the whistle was not in working order during the run of Train 413 on February 8.

3. The Brakes

Evidence discussed in detail hereafter supports the conclusion that there was no brake application on either train prior to the collision. It, accordingly, was of fundamental importance to examine whether this resulted from a malfunction of the brake system of either train.

a) Brake Systems

Each train was equipped with two standard air braking systems. One operated only on the engine consist and is called the "independent brake". The other operated on the entire train, on both the locomotives and cars, and is called the "automatic brake".

The independent brake is operated by a lever on the console in front of the engineman. The automatic brake is operated by using a brake handle also located in front of the engineman. The automatic brake system requires that each car has its own separate braking system. These are interconnected by an air line, called the brake pipe, which runs the entire length of the train. Air pressure is maintained at a certain level in this line by a compressor and a main reservoir in the locomotive.

When a service brake application is desired the engineer moves his brake control to cause a reduction in the pressure in the air line. This causes a control valve in each car to allow air to flow to the brake cylinder which, in turn, allows the brake shoes to come in contact with the wheels. The force of the brake application depends on the degree of the air pressure reduction which the engineer creates. The highest normal brake application is called a full service application. The brakes are released when the engineer adjusts his control to allow air pressure in the line to be restored.

In the case of an emergency brake application, the maximum braking effort is achieved because the brake control valve of each car allows additional air from a separate emergency reservoir to flow to the brake cylinder. An extra 20% braking pressure is thus applied. An emergency brake application can be initiated by the engineer advancing the lever for the automatic brakes as far as it will go, by the front-end trainman pulling a lever located in front of his seat on the left hand side of the locomotive cab, and from the rear end of the train, by the crew pulling any of the levers or cords located in the caboose. The system is also designed so that the brakes will engage in an emergency application if there is a sudden loss of air pressure resulting, for example, from a rupture of the brake pipe from any cause whatsoever.

b) Condition of the Brakes

There was no evidence to suggest that the braking system of Train 413 was in any way faulty. There had been the appropriate test of the train brakes prior to the coupling of the engine consist in Edmonton and there was also a test of the brakes of the completely coupled train prior to departure from Edmonton. There was however no running brake test after departure from Edmonton and the required "Number 2 brake test" that ought to have been performed in Edson when the Edson-Jasper crew took over the train, was not performed because it was impossible to do so in the course of the "on-the-fly" crew exchange. Neither was there a running test of the brakes after departure from Edson. The Commission was advised by witnesses that this was because the uphill grade made a running brake test inconvenient.

The evidence indicates that there was very little use of the brakes on Train 413 in the trip from Edmonton to the collision. As described earlier, a "lurching" of the engines at low speed discouraged the Edmonton engineer from using the train brakes. He used them only once prior to Edson and on other occasions slowed and stopped the train by use of the throttle. There was a minimum application of the brakes at Edson in order to slow the train down for the crew exchange.

Conductor Smith assumed the train brakes were used to bring the train to a stop in the siding at Medicine Lodge. It is quite possible however that the train was stopped without use of the brakes and that only the independent brake on the locomotive engine was applied in the siding to prevent the train from rolling backwards.

After the collision the brakes on the 39 cars of the train which were not damaged in the collision were tested and found to be functioning properly.

The evidence leads the Commission to conclude that the brakes on Train 413 were in proper functioning condition. The quantity of information upon which that conclusion is based may not be as extensive as it might otherwise have been. However, the Commission considers the evidence adequate to support its conclusion.

As to Train 4, there was no report of any brake problem by the crews who operated the trains that made up Train 4 into Jasper. After Trains 4 and 6 were coupled in Jasper the required brake test was performed. The brakes were again used to bring the train to a stop in Hinton. The brakes of the undamaged cars of Train 4 were tested after the collision and worked properly.

It is therefore appropriate to conclude that the brakes of Train 4 were also in proper functioning order.

The Commission is accordingly satisfied that the absence of any brake application on either train prior to the collision was not the result of a malfunction in the braking systems of either train.

4. The Radios

The radios play an important role in traffic control. Although the messages transmitted by radio are subordinate to the directions conveyed by the signal system, the testimony of train crews established clearly that they consider radio communication to be of significant assistance to them in carrying out their duties. It is, for example, apparent from Conductor Smith's account of events immediately preceding the collision, that the radio is also fundamental to the effectiveness and value of the rear-end train crew on a CN freight train. It was therefore important to consider evidence regarding the condition of the radios on the two trains.

a) Radio Equipment

There were four different types of radios in use on the two trains. All were standard CN equipment.

i) Locomotive Radios

The locomotive radio on Train 413 was located on the console immediately in front of the locomotive engineer's seat. There was an auxillary speaker mounted on the ceiling intended to permit the front-end trainman to hear communications to the locomotive from either the conductor in the tail-end or the dispatcher. Not all locomotive cabs are equipped with such an overhead speaker but Train 413 was.

Transmission is performed using a hand control similar to a telephone receiver except that there is a press-to-talk button on it. There is also a control by which the engineer can adjust the volume. By the design of this control it is not supposed to be possible for the engineer to turn the volume down so low that the radio cannot be heard. The evidence of CN's radio expert however was that the design is inadequate in that regard. At normal operating noise levels it is not possible to hear the radio if the volume level is set very low.

The radio can transmit or receive on 4 preset frequencies or channels. It is designed such that when the hand set is replaced in its cradle the radio automatically reverts to Channel 1 regardless of which channel it was on previously. However, so that automatic reverting to Channel 1 can be avoided if it is not wanted, as for example when the locomotive is being used in yard service, many locomotives are outfitted with a "dummy cradle". When the hand control is placed there, the radio does not automatically revert. It was not possible for CN to have advised the Commission whether the locomotive radio in Train 413 had this feature.

The radio has a "tone" button which is used to signal the dispatcher when communication with him is desired.

The radio is used for end-to-end communication and for train-to-dispatch communication. It will also receive communications from other trains in the vicinity. This type of radio transmits at a power output level of 30 watts and is powered by the locomotive battery which is recharged automatically by the locomotive generator.

The locomotive radio on Train 4 was of the same specifications as that on Train 413.

ii) Caboose Radios

There were two radios in the caboose of Train 413. One of these was part of the caboose's permanent equipment and in the ordinary course would remain with the caboose unless removed for servicing. The plastic case of this radio is red and the radio is therefore called the "red radio". It is mounted in the cupola.

The red radio has a power output level of 5 watts and is powered by three standard lantern batteries. These batteries are not rechargeable and are intended to be replaced when they are low. There is a small light emitting diode that glows brightly during transmission if the battery supply is satisfactory. If the batteries are weak, the light will either blink or not illuminate at all during transmission.

The controls include an on/off switch, a press-to-talk switch on the microphone, a volume control, a "squelch" control and a channel select knob which provides a selection of four preset frequency channels. There is also a switch used to produce a "tone" for effecting contact with the dispatcher. The radio is connected to an external antenna on the roof of the cupola.

This radio is used primarily for communication with the head-end but can also be used in train-to-dispatch communication.

The other caboose radio on Train 413 was of the same specifications as the red radio except that its colour was grey. This radio was not part of the permanent equipment in the caboose but rather was brought on to the train by Conductor Smith. It had been obtained by Conductor Smith in Jasper on the evening of February 7 and was used by him on his run from Jasper to Edson that night. The radio would normally have been turned in at the Jasper terminal on Train 413's arrival there.

Normally, this radio is kept by the conductor at the desk at the back of the caboose. As there is no provision for an external antenna, when the grey radio is used inside the caboose, it is not as effective a transmitter or receiver as the red radio.

No 5-watt portable radio is used on passenger trains.

iii) 2-Watt Portable Radios

A front-end trainman such as Trainman Edwards would have had a small portable radio which he would have obtained from, and was intended to return to, his home terminal. This radio has a 2-watt output level and is powered by a rechargeable battery. In the ordinary course this radio is not used when the train is moving. It is provided to assist the front-end trainman in performing train inspections and other duties when he is off the train.

The rear-end crew of Train 4, that is the conductor and assistant conductor in the first half of the train and the assistant conductor and the trainman in the rear half of the train all had in their possession 2 watt portable radios of the same specification as Edwards' radio.

b) Condition of Radios

i) Train 413 – Locomotive Radio

One of the members of the predispatch crew that prepared Train 413 for departure from Edmonton was responsible for inspecting and testing the locomotive radio. He recalled that Locomotive 5586 did not have any radio when he first entered the cab. Accordingly, he installed a radio and tested it by calling the shop coordinator in the Calder yard.

The Commission was advised that the radios in locomotives are inspected during the quarterly inspection of the locomotive. The last such inspection of Locomotive 5586 had occurred on December 17, 1985. Presumably whatever radio was in the locomotive at that time was inspected. However, there was no record of when the radio installed in the locomotive on February 7 had last been inspected.

The antenna and other radio equipment permanently wired in the locomotive would have been inspected in that quarterly inspection if routine was followed. The inspection procedures include measurement of the reflected power of the antenna. If that measurement is greater than 1/2 watt, given a 30-watt output level, a reception problem could be encountered. Such a problem was in fact experienced on a locomotive radio used in the field radio testing undertaken as part of the collision investigation. The problem is usually remedied by cleaning the antenna and checking the connection.

The record of the December 17, 1985 inspections of Locomotive 5586 do not indicate that such a problem existed. The antenna would not therefore have been cleaned at the time of that quarterly inspection. The predispatch procedures do not include inspection or cleaning of the antenna. Accordingly, the antenna had not been cleaned for at least 5 months preceding the collision.

The Commission was also informed that locomotive radios are "bench tested" at least twice a year. This means they are removed from service and their components are inspected and tested by a technician. This is a very unsophisticated system intended to ensure that each locomotive radio receives regular testing. It was clear however that it would be very easy for a radio to be missed.

The Commission was not provided with any record of the bench testing of the locomotive radio in Locomotive 5586 at the time of the collision. As records relating to the maintenance of that radio were requested, the absence of such a record in the documents produced by CN leaves the Commission to conclude that no such record exists.

Nonetheless, other evidence presented to the Commission is sufficient to satisfy it that the locomotive radio was working properly. The predispatch crew in Edmonton did a successful operational test. Engineer Janusz used the radio during the run of Train 413 from Edmonton to Edson without difficulty. Many of the crew members of the trains in the vicinity of Train 413 after it departed Edson overheard transmissions initiated by Engineer Hudson using the locomotive radio. Conductor Smith said he had radio conversations with Engineer Hudson on departure from Edson and at each of the control points up to and including Hargwen. The dispatcher had a radio conversation with Engineer Hudson and the Commission heard a tape recording of that conversation in which transmissions from Train 413 were loud and clear. Accordingly, notwithstanding the inadequacies of the maintenance records, the Commission is satisfied that the locomotive radio on Train 413 was working properly.

ii) Conductor Smith's Grey Radio

The grey portable radio in the possession of Conductor Smith on February 8 had been obtained by him in Jasper the evening before. He recalled 3 incidents on the Jasper-Edson trip on February 7 which, in retrospect, he thought might have suggested a problem with the grey radio.

CN was able to produce a record of the maintenance history of the grey radio. There is no program of preventative maintenance for grey radios. They are only inspected if they are reported to be in bad order. The last inspection of the grey radio Conductor Smith had at the time of the collision had been done on October 9, 1985. The record does not indicate what malfunction had resulted in its being in the radio shop. Presumably whatever was wrong was remedied on that occasion.

Routine procedures call for an operational test of a grey radio prior to it being issued to a running crew member. If, during this test, the low battery indicator fails to glow steadily, the batteries are changed.

After the collision, tests were done of the output power level, transmission frequency accuracy and reception sensitivity on the grey radio at both -15°C and room temperature. For these tests, the same batteries that were in the radio on February 8 were used. The results of all the tests were satisfactory.

The radio was also used on a train running between Edson and Jasper on February 13, 1986 and on several field tests in February and March. Again, the original batteries were used. All transmissions from the grey radio were received loud and clear in the locomotive on these tests and all transmissions from the locomotive were received loud and clear by the grey radio.

The results of these tests, considered along with the fact that Smith took the grey radio with him when he jumped from the train and used it successfully in transmissions after the collision, permit the Commission to conclude that at all relevant times, the grey radio was working properly.

iii) Train 413 – Red Radio

There is also no program of preventative maintenance for caboose red radios. They are used until a rear-end crew member reports some malfunction or deficiency. There is no procedure for regularly changing or testing the batteries in the red radio, nor are there any fresh batteries available in the caboose should the batteries in the radio fail during a trip.

Testing of the batteries of Train 413's red radio after the collision revealed that they were sufficiently low that the warning light ought not to have glowed steadily during transmission. The fact that it did glow steadily must be taken as raising a doubt as to the trustworthiness of that indicator.

The post-collision inspections of the red radio confirmed that the channel indicator knob did not "click" into each channel as it ought to have. This had been mentioned by Conductor Smith in his evidence. He said he discovered this deficiency when he was attempting to call the head-end just prior to the collision.

Other bench tests of the red radio produced satisfactory results.

The antenna on the caboose to which the red radio is connected was examined after the collision and was found to be in proper working condition.

The rear-end crew from Edmonton to Edson reported that the red radio operated satisfactorily during the trip. Though he did not perform the required radio test on the red radio prior to departing Edson, Conductor Smith used the red radio several times prior to the collision. In fact he said that the last communication he had with the head-end at Hargwen was made using the red radio. The red radio also performed satisfactorily on several different channels when used after the collision by Conductor Smith and when tested in the field tests performed as part of the collision investigation. Accordingly, notwithstanding the low battery power and the "non-clicking" condition of the channel selector knob, the Commission is satisfied that the red radio was transmitting and receiving properly at all relevant times.

iv) Train 4 – Locomotive Radio

The crews who had operated Train 4 prior to its arrival in Jasper had experienced difficulties with the locomotive radio. In fact, the radio had been changed in Blue River. However, this did not remedy the situation and intermittent radio problems were experienced even after the change.

The engineer who brought Train 4 into Jasper says he made a note of the radio problem on a form provided for that purpose and left it in the locomotive cab. He did not mention the problem to any of the station personnel in Jasper.

The employee who normally would look at the form on which the engineer said he noted the problem said he did not do so on the morning of February 8 because when he entered the cab Engineers Miller and Peleshaty were already there and nothing was said of the deficiencies noted on the form.

The engineer who brought the train to Jasper advised the Commission that he told Engineer Peleshaty of the radio problem but it is not clear whether Peleshaty was told that the problem had been intermittent. It is possible that Peleshaty would have thought that because there was no problem with the radio when he used it prior to departure from Jasper, there was no longer any reason for concern.

The surviving crew of Train 4 were not aware of any problem affecting the locomotive radio. It was used in the brake tests performed prior to departure from Jasper and in communication with dispatch at the time of departure. The last communication made using the radio was when Rear Trainman Quast advised the head-end that the train was clear to depart Hinton at 0825. It is therefore clear that the locomotive radio was working shortly before the collision. There is no evidence of any use of the locomotive radio after Hinton and prior to the collision.

Some residual doubt must remain as to the condition of the radio because of the intermittent problems that had been experienced west of Jasper and the fact that nothing had been done to service the radio after those problems were experienced. Accordingly, although a definite conclusion that the locomotive radio of Train 4 was functioning properly cannot be made, it seems likely that it was.

v) 2-Watt Radios

The 2-watt radio used by Trainman Edwards would have been turned off at all relevant times and, accordingly, no consideration of its condition is necessary.

As to the 2-watt radios used by the rear-end crew of the passenger train, the Commission was advised by Mr. Raistrick, a vacationing CN employee who was a passenger on Train 4 that shortly before the collision he was in the company of Brownlee and MacMillan and that the portable radios in their possession were on. No other information as to the condition of those radios is available.

The 2 running crew members at the rear of Train 4, Timpe and Quast advised the Commission that the portable radios in their possession were on, and functioning properly on the morning of February 8.

c) Radio Propagation at Dalehurst

Many of the CN running crew employees who gave evidence to the Commission reported experiencing "dead spots" along the route from time to time. These are places where radio communication is not possible. There seemed to be a conflict in the evidence of running crew members and CN management on this point. CN management were prepared to acknowledge that dead spots exist only where physical features like tunnels made communication by radio impossible. Crew members gave the impression that the incidence of dead spots was greater than that.

CN presented evidence of radio propagation tests done after the collision in the vicinity of Dalehurst. These tests were done on more than one occasion using the actual red and grey radios from the caboose of Train 413 and radio equipment the equivalent of that which was on the two lead locomotives and in the rear of Train 4.

These tests showed that transmission from either the red radio or the grey radio on Train 413 from the points when Conductor Smith says he effected radio transmissions at or near Dalehurst would have been received by the radio in the head-ends of both Trains 413 and 4 and in the rear-end of Train 4.

The Commission accepts this evidence as establishing that there were no features of the Dalehurst topography which created any "dead spots" which could have affected radio communications on February 8.

The Commission was also advised by experts and accepted that the unusually severe geo-magnetic activity which occurred on February 8 would not have affected radio transmissions at Dalehurst.

d) Conclusions and Observations

The Commission concludes that there is no doubt that the radios in Train 413 were working properly at all relevant times. There is a possibility that the radio in the locomotive of Train 4 was not in satisfactory working condition at the time of the collision but the Commission considers that possibility to be sufficiently remote to permit it to conclude that there was no malfunction of the radios on either train. No deficiency in the radio communication system was among the factors which contributed to the collision.

The Commission's review of the radio system however did bring to its attention several matters which it considers of significance and which it suggests are in need of attention by either CN or the Canadian Transport Commission or both. However, in light of the conclusion reached regarding the radio systems' contribution to the collision, the Commission does not put these observations forward as formal recommendations. The Commission's observations regarding the radio system are:

1. If the use of a caboose is to be continued on freight trains,* then it should be equipped with a radio of at least the same standard as the locomotive. The Commission is of the view that the radio communication requirements of the conductor are no less significant than those of the engineer. The conductor is,

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* It is outside the terms of reference of this Commission to engage in the current debate as to the value and utility of the caboose. Nothing contained in this Report ought to be construed as a conclusion that the caboose is essential to the operation of a modern freight train. This Commission has simply not considered that matter.

after all, in charge of the train, in theory. CN suggested that a convenient power supply for a locomotive quality radio in the caboose would be a problem. The Commission is confident that this problem is capable of being overcome and that CN's effort in overcoming it would be worthwhile.

2. The Commission is also concerned that there is no procedure by which the rear-end crew is kept aware of what channel the engineer is using. Should there not be such a procedure?

3. End-to-end communication is not possible when the engineer is engaged in train-to-dispatch communication. Some means should be found for permitting the conductor to communicate at any time to the head-end that he wishes to speak to the engineer.

4. The Commission noted that many front-end trainmen indicated that they often cannot hear radio transmissions. The evidence that the volume can be turned so low as to make it impossible to hear the radio in noisy operating conditions was noted above. Front-end trainmen who hear transmissions received in the locomotive said that they often cannot hear the engineer's side of radio communications. Consideration ought to be given to the use of earphones so that all crew members can hear all radio communications.

5. Procedures must be established to ensure that radio malfunctions are brought to the attention of station personnel by an arriving crew and that they are repaired before the train is allowed to depart.

6. Similarly, the system by which locomotive radio maintenance is performed is in need of improvement to ensure that each radio receives a regular maintenance inspection.

7. Predispatch procedures for locomotives and for cabooses ought to involve inspection of the antennae to ensure that they are clean and properly connected to the radios.

8. Inspection procedures for red radios in cabooses should be improved. The system should not require a malfunction of a red radio before it receives any inspection. At the very least, spare batteries ought to be provided in the caboose so that the red or grey radio batteries can be replaced should they not work properly during a trip.

9. As the evidence suggested that the grey radio is used frequently in end-to-end communications there should be a hookup to an exterior antenna at the rear desk of the caboose for use with the grey radio. This mechanism should be such that the grey radio can be quickly attached to or detached from the antenna so its usefulness outside the caboose is not impaired.

10. The procedures relating to the assignment of a grey radio to a train crew should include not only the operational test of the radio but a test of the power output of the batteries. They should be discarded and replaced if low, even though the radio may work properly.

C. Signal System

It was of immediate concern to those involved in the investigation of the collision to determine what indications the signals at Dalehurst had displayed as the two trains approached Dalehurst. CN undertook a detailed examination of the components of the signals at Dalehurst and of their operation. A great deal of this investigation was carried out in the presence of the assigned officers of the CTC. It was clear from the outset of these proceedings that the Unions representing the train crew members were anxious that the Commission undertake a very careful examination of the signal system.

The Commission spent much time learning how the signal system is intended to operate, reviewing the investigative procedures undertaken by CN and undertaking its own examination of the system. The Commission is satisfied that the review of this question was appropriately exhaustive and that the conclusion is inescapable that there was no malfunction of the signal system prior to the collision.

1. The System

Signals are a critical component of the system of train traffic control. Train movements on the Edson subdivision are controlled by an electronic and computer assisted system called Centralized Traffic Control. This system is operated by a dispatcher in Edmonton.

One of the dispatcher's duties is to decide where conflicting train movements will occur and to transmit appropriate instructions to the field to set signals and switches to accomplish the meet in accordance with his decision.

A fundamental feature of this system is called "interlocking". All of the field components in a given area, signals and switches, are interlocked electrically with each other. The effect is that it is impossible for two field components to be in such a condition that together they create a dangerous situation. For example, if a signal governing eastward traffic on a section of single track is green, the signal governing westward traffic on the same section of track cannot, because of interlocking, also be green. Similiarly, if a switch is lined against traffic in a certain direction, the signal governing traffic moving in that direction cannot be green.

The consequence of the interlocking feature is that when the dispatcher transmits an instruction to the field, the equipment in the field which receives that instruction will not obey it unless the instruction is compatible with the state of all of the field components which are interlocked with the component affected by the instruction.

Another important feature of the system is that along the whole of the route, sections of track are divided into track circuits. Electric current flows through these circuits. Each wayside signal is connected to the track circuit or series of track circuits to which it is adjacent. The signal is located at the start of the track circuit of which it is a part.

When anything occurs to break (or shunt) the track circuit to which a signal is connected, the signal will immediately turn to red. Accordingly, if a rail is broken, the circuit will be broken and the signal at the start of that section of track will turn red, warning any approaching train not to proceed further. Also, when a train enters the track circuit it will short the track circuit and the signal will turn red. Accordingly, whenever the lead locomotive of a train passes the signal governing its movement, that signal will turn red identifying the presence of the train within the block.

Every component of the signal system is designed to be "failsafe". This means that when any component malfunctions the system is designed to leave the system in a safe condition. For example, the coloured lenses that produce the different colour displays in a signal light are so arranged that if there is an interruption in the power supply that controls them, gravity will ensure that only the red lens can be positioned in front of the bulb. This is in fact what happens when a track circuit is broken by a broken rail for example – the power supply regulating the position of the coloured lenses in the signal is cut off and the red lens moves in front of the light by force of gravity.

Various events in the field result in coded messages being sent to the dispatch office. A computer records these messages and the time of their receipt. This information can later be retrieved in the form of various computer reports. The reports of this type which were presented to the Commission included the "System Log" for February 8. This is a record of some of the instructions sent by the dispatcher to the field and the activities which occurred as a result.

The Commission was also provided with a number of "Signal Activity Reports" which are a record of each request made by the dispatcher affecting particular home signals, the response to that instruction and the time when the signal went to red as a result of a train passing.

The Commission also received the "Train Activity Report" for each train that travelled over the subdivision on February 8. These reports show the time that each train arrived at each station along the route. There is a segment of track at each station called the "O/S Track" (on station track). When the train to which the dispatcher has given the right of way arrives on that track an electronic message is sent automatically to the dispatch office and the time of arrival is recorded by the computer.

2. Computer Records of Signal Activity – February 8

The Commission examined the computer reports regarding activity affecting the relevant signals on the morning of February 8.

One of these records is the Signal Activity Report recording signal activity of Signal 1730, the Dalehurst home signal for eastbound trains, and of Signal 1729N, the Dalehurst home signal for westbound trains on the north track.

This record shows that at 0358:36 the dispatcher requested a clear signal for Signal 1729N, that the request was accepted, and that the signal indicated clear. The report also shows that the signal went back to red at 0406:00 when westbound Train 487 passed through Dalehurst. There is nothing in the record to indicate any request having been made to alter Signal 1729N from red, from then until the time of the collision. After Signal 1729N reverted to red, the next activity indicated is the request by the dispatcher for a clear signal on Signal 1730 to permit the eastbound movement of Train 202 followed by the same request relating to the movement of Train 354. These are the trains which met Train 413 at Medicine Lodge.

The record shows that the dispatcher requested another clear signal on Signal 1730 at 0830:13. This is consistent with the dispatcher's evidence that at about that time he lined a route for Train 4 to pass through Dalehurst onto the south track.

The dispatcher's evidence relating to his control of the movement of Train 413 is that after the Medicine Lodge meets, he requested the switch at the west end of the Medicine Lodge siding

to be opened to permit Train 413 to exit the siding onto the main track. The System Log indicates that this request was made at 0800:44. The Train Activity Report for Train 413 indicates that the train left the siding at 0802:55.

The dispatcher said he would at that same time have cleared the signal at Hargwen, where the double track commences, to permit Train 413 to proceed onto the north track. No action was necessary to line the switch for such a movement because it had previously been opened to permit Train 354 to move from the north track onto the single track east of Hargwen and thereafter remained open. The Signal Activity Report for the Hargwen home signal indicates that it was cleared at 0801:06 which is just shortly after the Medicine Lodge switch was opened. The records therefore fully support the dispatcher's memory of his activity.

The Signal Activity Report for Hargwen indicates that Train 413 passed that signal at 0820:47.

The dispatcher said that he would not have taken any other steps relating to the progress of Train 413 after he cleared the signal at Hargwen. At that point therefore Train 413's progress was unrestricted until the train came within range of the Dalehurst approach signal. The Dalehurst home signal would have still been red, having not been changed from that condition since Train 487 passed it about 4 hours earlier.

The next step taken by the dispatcher was to line the tracks to permit Train 4 to pass through Dalehurst onto the south track. The System Log indicates that the dispatcher requested the switch at Dalehurst to be opened at 0828:45 and that it was confirmed open at 0829:07. As mentioned above, the Signal Activity Report for Signal 1730N indicates that a request for a clear signal was made at 0830:13 and that the signal went clear at 0830:32.

Accordingly, the computer records and the evidence of the dispatcher are consistent only with the conclusion that Signal 1730N was permissive for Train 4 and that Signal 1729N was red for Train 413.

The computer does not record activity at approach signals. However, the signal system is designed so that when the 3 lights of the Dalehurst home signal, Signal 1729N, all display red, the approach signal, Signal 1703, cannot show anything other than yellow/red or red/red. This is a feature of the interlock principle previously described whereby knowledge of the display of one signal permits a conclusive deduction as to the display of other signals in the vicinity.

Signal 1703 would display red/red if there was something breaking (shunting) the track circuit between it and the home signal. Nothing in the evidence suggests that the track circuit had been shunted and the uninhibited passage of Train 413 between the two signals removes any reasonable doubt on that score. Accordingly, the approach signal must have displayed yellow/red.

The computer records and evidence of the dispatcher indicate only that the display on the eastward Dalehurst home signal, Signal 1730, would have been permissive. That signal is designed to be capable of displaying five different permissive signals. The choice as to which one of those five was displayed would have been made automatically by the signal control equipment in the field on the basis of the condition of other field factors.

One of those factors is the condition of the Dalehurst switch. The System Log indicates that the Dalehurst switch was open. Accordingly, two of the five possible permissive displays for Signal 1730 could not have been showing as they are possible only when the switch is closed.

Similarly, other field conditions make possible both the elimination of two other possibilities and the conclusion that the eastward home signal displayed red/green/red. Given the "L" triangle on the mast, this display would be a "limited clear" signal. Rule 283(a) of the UCOR states that such a signal is an authority to "proceed, limited speed within interlocking limits or through turnouts". The signal would therefore be an instruction for Train 4 to slow down to 45 miles per hour in order to bear right and proceed via the turnout onto the south track.

As to Signal 1748, the Dalehurst approach signal for eastbound trains, the only indication that could possibly have shown if the Dalehurst home signal displayed red/green/red was yellow/green. With the "L" triangle on the signal mast this display would be an "approach limited signal" and would instruct the engineer to "proceed approaching the next signal at limited speed" which is 45 miles per hour.

3. CN Investigation

The investigation of the signal apparatus at Dalehurst which was undertaken by CN following the collision consisted of several stages.

The first stage commenced within an hour of the collision. Mr. Harry Kidd, one of CN's signal maintainers resident in Hinton arrived at Dalehurst at 0935 and after assisting some passengers of the VIA train, commenced an examination of the physical condition of the components of the signal system and the switch mechanism at Dalehurst and at the site of the approach signal for westbound traffic, Signal 1703.

Components of the system were examined to determine whether there was evidence of any damage which might have affected the operation of the system prior to the collision. There were also tests of the electrical properties of the components. Nothing irregular was revealed.

Mr. Kidd also examined the 111 relays which are housed in a wayside bungalow near the Dalehurst home signal. These relays are electrical switches which are either open or closed – energized or de-energized. Mr. Kidd recorded the position of each of the relays.

The positions of the relays when Mr. Kidd observed them shortly after the collision are of significance. One of the relays indicated that a request for a permissive signal for an eastbound train had been received in the field and had been accepted. In other words, the relays reflected that Signal 1730 had been cleared to permit passage of an eastbound train to the south track at Dalehurst. The positions of all other relays were such that none of the other signals could have been displaying a permissive indication.

Because the Dalehurst switch was rendered "out of correspondence" by Train 413 running through it – that is because the switch was lined neither for the north track nor the south track after 413 passed – any request that the dispatcher might have made affecting the Dalehurst signals after Train 413 ran through the switch, could not have been accepted. Therefore there could not have been any resetting of the relays initiated by the dispatcher after the collision. Neither would it have been possible for anyone to manually reset the relays in the field after the collision without leaving evidence of having done so.

Accordingly, the positions in which the relays were found by Mr. Kidd, which was confirmed later by another CN official and still later by CTC investigators, provided strong corroboration for the conclusion reached in the examination of the computer records. This evidence indicates that Signal 1729N displayed red/red/red and that Signal 1730 displayed a permissive indication.

The CN investigators using information gathered from the computer system as to the events affecting the signal system which occurred and were recorded prior to the collision, recreated those events in the field to ensure that the reaction of the various components of the signal system was according to the design of the system.

This was accomplished by making the same request from the Calder dispatch centre as had been made by the dispatcher prior to the collision and by shunting track circuits in the places and sequence they would have been shunted by trains passing through Dalehurst on February 8.

In addition to this reconstruction, the investigators exposed the Dalehurst signal system to every situation which might conceivably affect it. This was done by initiating various requests from dispatch in Edmonton and by shunting track circuits in various locations and combinations. The tests involved people positioned appropriately to observe the components of the system and to record their observations. The documentation produced in the course of the tests was provided to the Commission. The results of the tests indicate that in every case, the signal system functioned as it was designed to function.

There is a regular program of maintenance for each signal. The instructions to the signal maintainers as to the tests and inspections to be performed at each signal at various time intervals are described in a handbook entitled "Signal Inspection and Test Rules".

Records are maintained by the signal maintainers as to the inspections and tests they perform on each signal and the results they observe. Where there is a report of an irregularity in the operation of a signal, the signal maintainer attends and completes an incident report.

The Commission was provided with all of the records kept by the signal maintainers responsible for maintaining the Dalehurst signal. These were reviewed in detail to determine whether they revealed any discrepancy in the maintainer's compliance with the maintenance rules. Everything was found to be in order.

4. Independent Assessment

The Commission retained the services of Kenonic Controls Ltd., a firm specializing in control and automation engineering, to undertake a study of the signal and control logic at the bungalow housing the signal control mechanisms at Dalehurst. The consultants performed an on-site inspection and reviewed the circuitry drawings which had been produced by CN.

Their conclusions are summarized in the report they filed with the Commission as follows:

> We find that the logic circuitry controlling the westbound signals at Miles 170.2 and 172.9 (Dalehurst) is designed to permit train movement only when it is safe to do so.
>
> It is quite inconceivable that a Green aspect could show at Mile 172.9 (Dalehurst) by any single logic or equipment malfunction. Selected multiple failures or malfunctions could, if they were prolonged and coordinated and were present along with all other normal conditions being properly satisfied could create an erroneous green aspect to show. The practical result is that such failures are extremely rare.
>
> The green aspect shows only if a number of permissive conditions are satisfied. The logic design is such that malfunctions will cause the red aspect to show.
>
> It would be impossible for an untrained person tampering with the track equipment to cause any aspect other than red to show.

In their report and in the evidence they presented orally to the Commission the authors of the report, Mr. D.H. Bowman and Mr. E.R. Kowch impressed the Commission that their review had been thorough and searching and that their conclusions were sound.

In oral evidence Mr. Bowman described in greater detail the nature of the conditions that would have to exist in order to produce an erroneous green aspect as mentioned in the second paragraph of the summary of his findings. The description convinced the Commission that the likelihood of such an event having occurred on February 8 at Dalehurst is miniscule. In any event, Mr. Bowman's evidence was that if it had occurred, there would most probably be evidence remaining afterward to so indicate. He said it would be extremely unlikely for such a condition to exist for a period prolonged enough to produce an erroneous permissive signal and disappear without any trace.

5. Subsequent Signal Irregularities

In the weeks following the collision engineers operating out of Jasper reported several irregularities in the operations of signals at various places on the subdivision. Each of those incidents was investigated by CN officials and complete reports of the investigations were presented to the Commission and explained by the oral testimony of the investigators. Three of the incidents involved Signal 1729N, the Dalehurst home signal.

In the majority of the incidents, CN was able to confirm that what had been observed actually happened or at least could possibly have happened. In each case, the engineer observed the unexpected. However, what he observed was not unsafe. For example, in one case during the course of upgrading from stop to clear, a signal displayed an approach indication for five seconds. In other words, the indication which the engineer saw momentarily, was more restrictive than the indication he was intended to see.

In another incident a signal turned red fourteen seconds prior to the train arriving at the signal. It was not possible for the engineer to stop the train without passing the signal. While this might not be a desirable operational situation, it did not flow from a malfunction in the signal system. In fact it was an example of the system functioning as designed.

In two of the incidents, both involving Signal 1729N, an engineer perceived a display on the signal which CN officials say could not have been displayed. In the first incident the engineer was observing the signal from the Obed spur line and it was later determined that it was impossible for him to see the signal light from the point that he claimed he saw it. CN concluded that he must have been seeing the reflection of the sun off the snow on the hood of the signal and misperceived it as a signal indication. As the signal is not intended to communicate any message to an engineer on the Obed spur, this incident does not raise any doubts as to the integrity of the signal.

In the other incident, the engineer observed an indication of red/green/red (limited clear) on Signal 1729N when he was about 4,000 feet east of it. He then observed it change to red/red/red and then to green/red/red (clear).

This raised concern because Signal 1729 is not supposed to be able to produce red/green/red.

The investigation established that at the point where the engineer had first observed the red/green/red indication, only the middle light was visible. The middle light was in fact green, but

the top light at that time was yellow not red. At 4,000 feet, the engineer was too far away to perceive this. The signal only becomes visible at a distance of about 3,300 feet. Tests confirmed that Signal 1729N is not capable of producing a red/green/red display.

CN did not consider it acceptable that the middle light of the signal should come into focus before the upper or lower lights. In fact, the focusing of the three lights of Signal 1729 had been altered after the collision at the request of the CTC. As a result of this incident CN refocused the lights so that they would all come into view at approximately the same time.

The Commission's consideration of the various signal incidents reported after the collision did not serve to alter the conclusion derived from the other evidence as to what the signals had displayed prior to the collision on February 8. Neither did those incidents serve to raise any doubt about the integrity of the signal system itself. A few of the incidents demonstrated to the Commission that while the crew members, at least those who made their reports, are intimately familiar with what they can expect the signals to display and recognize an irregularity when they see one, their knowledge of the mechanics of the operation of the signal system is not sufficient to permit them to have the degree of confidence in the integrity of that system that management clearly has. The Commission was also impressed that while CN seems to take reported signal irregularities seriously and that while it investigates them thoroughly, there is no policy of communicating the result to the crew member whose report initiated the investigation. It would seem to the Commission that some basic instruction to crews as to the operational logic of the signal system and a policy of communicating to crews the results of signal incident investigations would serve to reinforce running crew confidence in the integrity of the signal system.

6. False Proceed Incidents Across the National System

In an effort to assist the Commission in assessing the reliability of the signal system, the Unions filed lists of signal incidents which had been reported by their members over the course of several years. At the Commission's request CN compared the listed incidents with those of which it had records. CN confirmed that in the last six years there have been thirteen incidents across their entire system where a ' false proceed" indication had been displayed by a signal.

A "false proceed" is a situation where the signal displays an aspect more permissive than that which it is intended to display.

CN records indicated that seven of the thirteen incidents involved employee errors in either initial wiring of the signal circuitry or in wiring done during maintenance. Errors in wiring during the initial installation should be revealed by the extensive operational tests performed after installation and before a signal is put into operation. The Commission was provided with the records to indicate that the signals at Dalehurst had received such extensive testing.

Errors in wiring during maintenance should be revealed by the regular testing and inspection of signals and, as mentioned above, the records relating to the testing and inspection of the Dalehurst signals indicated that a level of vigilance sufficient to reveal any circuitry errors had been maintained.

Three of the thirteen false proceeds were caused by foreign material causing the moving parts of the signal apparatus to stick resulting in a more permissive display than intended.

Examination of the signals at Dalehurst after the collision established that there was no such foreign material present in the sealed signal units. In any event, the signal mechanisms in place at Dalehurst at the time of the collision had a special circuit designed to give warning when a signal

is stuck in an undesired position. The last time Signal 1729N had been green was four hours prior to the collision. Accordingly, there was plenty of time for the stuck mechanism circuit to operate and signify the presence of a stuck mechanism if one existed. Further, if there had been a stuck mechanism during that period, it would not have been possible for Signal 1730 or the Dalehurst switch to have been changed as they were during that four hour period. The evidence establishes therefore that the signal mechanism could not have been stuck.

Two of the false proceeds were found to have been caused by defects in the manufacture of the signal mechanism by one supplier. All of the signals obtained from that manufacturer have been replaced and there is no doubt that such a defect could not have affected Signal 1729N.

Finally, the thirteenth false proceed incident was the result of vandalism. It is also clear that Signal 1729N had not been damaged by vandals prior to the collision.

Clearly then, none of the causes of the thirteen false proceeds was present at Dalehurst on February 8.

There were several other incidents in the Unions' lists which CN explained as misperceptions or which did not constitute false proceeds. There were other incidents on the list of which CN had no record.

The evidence regarding system wide irregularities did not serve to introduce any doubt as to the conclusions reached regarding the display of the signals at Dalehurst when the trains approached on February 8.

7. Signal Visibility

The Commission also considered the possibility that though the Dalehurst signals displayed the proper indications, there might have been some misfocusing, obstruction or other impediment which prevented the signals being visible to an approaching engineer. An investigation revealed that there was no such hindrance.

8. Geomagnetic Activity

Because there was an abnormally high level of geomagnetic activity in the Hinton area at the time of the collision, concern was expressed that this might have affected the signal system. The activity was not confined to Hinton – it was present at least across Western Canada. Evidence was heard from several experts that the design of the signal control circuitry and its housing, and that the cable running from the signal bungalow to the signal mast is short, underground and not grounded, preclude the possibility of induced currents affecting the system and in particular affecting it in such a way as to alter the signal aspect.

While the phenomenon of geomagnetic activity is acknowledged to have been present, it may be confidently excluded as a potential cause of a signal malfunction. The phenomenon has been reviewed carefully and is regarded as having had no relevance to this accident.

9. Dalehurst Switch

As the switch in the turnout at Dalehurst is a component of the traffic control system and is controlled by the dispatcher in the same manner as the signals are controlled, and as the switch is interlocked with those signals, it is appropriate at this point for the Commission to state its conclusion regarding the position of that switch at the time of the collision.

The Commission is satisfied that the switch at Dalehurst was open and lined against Train 413 at the time Train 413 passed through it. The evidence on this point is extensive, persuasive and conclusive.

Some of that evidence is contained in the System Log which records that the dispatcher requested the Dalehurst switch to be reversed or opened at 0828:45 and that the switch was in fact reversed at 0829:07. The log does not indicate any other activity relating to that switch after that time.

The information recorded on the Train Activity Reports for Trains 413 and 4 is consistent only with the Dalehurst switch being open. The last entry on Train 413's Train Activity Report is a record of its arrival at Hargwen. There is nothing on that report to indicate that Train 413 arrived at Dalehurst. The Train Activity Report for Train 4 however indicates that Train 4 arrived on the O/S track at Dalehurst at 0840:34. This entry is obviously not correct since the point of impact was west of the Dalehurst O/S Track. Train 4 never entered that O/S Track. It was in fact Train 413's arrival at the east end of the Dalehurst O/S Track which occurred at 0840:34. The computer record is not an accurate reflection of events because the switch was lined for Train 4's passage through Dalehurst on to the south track. The inaccuracy in this record therefore supports the conclusion that the switch was open.

Observation of the position of the relays in the Dalehurst bungalow after the collision and of the switch itself also confirmed that the switch had been opened in preparation for Train 4's arrival and that Train 413 had run through the switch notwithstanding that it was lined against it.

10. Conclusions

The evidence is incontrovertable that as Train 413 approached Dalehurst, it received a yellow/red display from Signal 1703, the approach signal, and a red/red/red display from Signal 1729N, the home signal. The Commission so finds.

As Train 4 approached Dalehurst from the west, it received a permissive indication from both the approach signal and the Dalehurst home signal. Shortly after Train 4 came into sight range of the home signal, its display changed to red/red/red as a result of Train 413 entering the Dalehurst station at the east end of that station and shunting the track circuit.

The Commission concludes that the signal system operated as designed. The Commission is also satisfied that nothing in the design of the signal system was inadequate insofar as the events of February 8 are concerned. The Commission does however observe that the degree of confidence of CN management in the integrity of the signal system is not universally shared by CN's running employees. Better education and communication policies would serve to alleviate this situation.

D. Control of Train 413 and Train 4

Having set out its considerations and conclusions regarding the condition of the equipment involved in the movement of the trains which collided at Dalehurst, the Commission turned to the condition and actions of the men in control of those trains. It is convenient to initially consider the evidence with regard to 2 specific matters relating to the operation of the trains. These are the speed of the trains prior to collision and whether there was any brake application on either train.

1. Speed

a) Train 413

There are 2 pieces of primary evidence as to the speed of Train 413 as it approached the collision. The evidence of Conductor Smith is that when the caboose was at Mile 169 and the locomotive was just west of Mile 170, he considered the speed to be, "about track speed", 50 miles per hour.

The second piece of primary evidence is derived from information recorded when Train 413 passed the hot box detector at Mile 166.5. Calculations based on that information indicate that when the locomotive passed the detector it was travelling 37.6 miles per hour. When the caboose passed the detector it was travelling 46.4 miles per hour. The train thus gained 8.8 miles per hour while travelling the distance of its length, 6,124 feet.

Other evidence regarding the probable speed of Train 413 was obtained through various calculations, simulations and tests performed by CN engineers.

i) Train Performance Calculator (TPC)

CN has a computer program which it ordinarily uses to establish the running schedules for its trains. The data base of this program includes all relevant information about the track profiles of CN lines including grades and curves. The characteristics of the train being studied – its weight, length, consist, locomotive power, et cetera, are entered. Assumptions regarding throttle position and braking are also entered. The computer can then calculate the running times between a starting point and other points along the route and the speeds achieved at those various points.

CN ran this program using the information relevant to the running of Train 413 from Medicine Lodge to the point of impact on February 8. A detailed statement of the information used and adjustments made to account for various conditions that would have affected the run of Train 413 was included in the report of the exercise presented to the Commission. The test appears to have been very carefully done.

The first TPC computer run was initiated from a stop at Medicine Lodge. Full throttle and no braking were assumed from Medicine Lodge to impact. The running times to Hargwen, the hot box detector and Dalehurst were very close to the actual times known about the February 8 run of Train 413. The speed at the hot box detector was also very close to that known of Train 413. The computer train attained a speed of 57.6 miles per hour at Mile 170.2 (the approach signal), 57.4 miles per hour at Dalehurst and 58.7 miles per hour at impact. All of these speeds exceed the 50 mile per hour speed limit set for freight trains on the Edson-Jasper CN line. The results of the TPC simulation are summarized in Table 2 and shown on Figure 2.

A second computer run was done assuming full throttle from Medicine Lodge and such braking as would be required to ensure that the train did not exceed the track speed limit. With

those assumptions the arrival time at Dalehurst was 42 seconds later than in the first run, and 30 seconds later than in the actual run of Train 413. As the entire time difference was accumulated in the last 7 miles of the run, the CN expert was of the opinion that the difference was significant enough to establish that there had been no braking on Train 413. It was also his opinion that the speeds established by the test were remarkably close to the speeds that Train 413 actually attained.

ii) Train Simulator

CN also used their Train Simulator to recreate the run of Train 413. In this exercise the simulation train's progress was monitored from the hot box detector to impact with a speed of 38 miles per hour at the starting point. The results of this test appear on Table 2 and Figure 2.

In the first simulator run it was assumed that full throttle was used and that there was no brake application. The lapsed time from the hot box detector to Dalehurst was again very close to both that observed in the TPC test and to that known about Train 413. The speed at the approach signal was 59.0 miles per hour, at Dalehurst was 60.0 miles per hour and at impact was 61.2 miles per hour.

Further simulation runs were performed with brake applications introduced at different logical places. The arrival time at Dalehurst in those runs was up to one minute later than the known arrival time of Train 413. Again the conclusion drawn by the expert was that there had been no brake application on Train 413 between the hot box detector and Dalehurst.

The CN expert considered the speeds produced by the TPC tests to be more accurate than the results produced by the simulator tests. The program on which the TPC operates takes into account more detail about the actual conditions prevailing in the train run being analyzed.

iii) Test Train

At the request of the Commission, CN assembled a freight train having physical characteristics as similar as possible to those of Train 413. On April 16, 1986, this train was used in a test run from Medicine Lodge to the point of impact.

Notwithstanding the efforts to make the test train as much like Train 413 as possible there were differences. The environmental conditions on April 16 were also different from those on February 8. Some of the differences would have caused the test train to travel faster than Train 413 and some would have caused it to travel slower.

At the start of the test, the test train was stopped in the siding at Medicine Lodge. From there it was operated at full throttle without brake application to the point of impact. The time that it arrived at each mileboard and at the various points where comparison with Train 413's arrival time is possible, were noted. The speed of the test train as indicated by the train's speedometer at each of these points was noted. At 5 points the speed was also determined by radar. The results of this test are shown in Table 2 and Figure 2.

The test train attained a speed of 36.5 miles per hour at the hot box detector, 58.5 miles per hour at the approach signal, 60 miles per hour at Dalehurst and 61 miles per hour at the point of impact. The running times to each of those points compared closely to the known running times of Train 413 and the TPC and Simulator tests.

Those who conducted the test run concluded that there could not have been a brake application on Train 413 after Medicine Lodge and that its speed at impact must have been very close to 60 miles per hour.

A TPC test run using the parameters relevant to the run of the test train was undertaken and the results closely paralleled the results of the run of the test train. This served to strengthen the CN expert's confidence in the reliability of the TPC. Of the three simulation procedures employed, the CN expert considered the TPC result to be the most reliable.

iv) Caboose Stopping Distance Calculations

It was possible to determine the distance travelled by the caboose from its position when the locomotives collided to its position when it stopped. The impact would have immediately ruptured the brake pipe causing an emergency brake application. This would have affected the caboose about 5 seconds after impact.

Given this information and taking into account only the effects of an emergency brake application, the speed of the caboose at impact was calculated to have been 53.5 miles per hour.

However, it is known that the impact itself would have reduced the stopping distance of the caboose. The stopping effect of the impact and derailment forces were also calculated and the conclusion made by the CN expert was that a train speed at impact of about 60 miles per hour was consistent with the forces that would have existed. The calculations derived from the known stopping distances of the caboose therefore were, to the CN witnesses, consistent with the conclusions regarding the speed at impact drawn from the TPC and other simulation tests.

v) Conclusions

The duration of the runs of the simulators, particularly the TPC simulator so closely correspond to the known duration of the run of Train 413 that the speed indicated by the simulators is to be accepted as accurate. Therefore, the Commission concludes that at the point of impact Train 413 was travelling at approximately 59 miles per hour and that it had exceeded maximum track speed, 50 miles per hour, from about Mile 168 to the point of impact.

TABLE 2
Summary Results of Speed Determination Tests

	Train 413	TPC	Train Simulator	Test Train
Medicine Lodge to Hargwen Lapsed Time	17:52	17:48	–	19:56
Speed at Hargwen	–	20.0	–	18.0
Hargwen to Hot Box Detector Lapsed Time	12:30	12:30	–	13:29
Speed at Hot Box	37.6	37.2	38.0[1]	36.5[2]
Hot Box Detector to Mile 170.2 Lapsed Time	–	4:42	4:30	4:34
Speed at Mile 170.2	–	57.6	59.0	58.5[2]
Hot Box Detector to Dalehurst Lapsed Time	7:17	7:18	7:10	7:10
Speed at Dalehurst	–	57.4	60.0	60.0[2]
Hot Box Detector to Impact Lapsed Time	–	7:42	7:30	7:29
Speed at Impact	–	58.7	61.2	61.0[2]

[1] Speed assumed – Hot Box Detector was start of Train Simulator run.

[2] Speed is average of Test Train speedometer reading and radar reading.

Note: Lapsed Time is in minutes and seconds; Speed is in miles per hour.

FIGURE 2

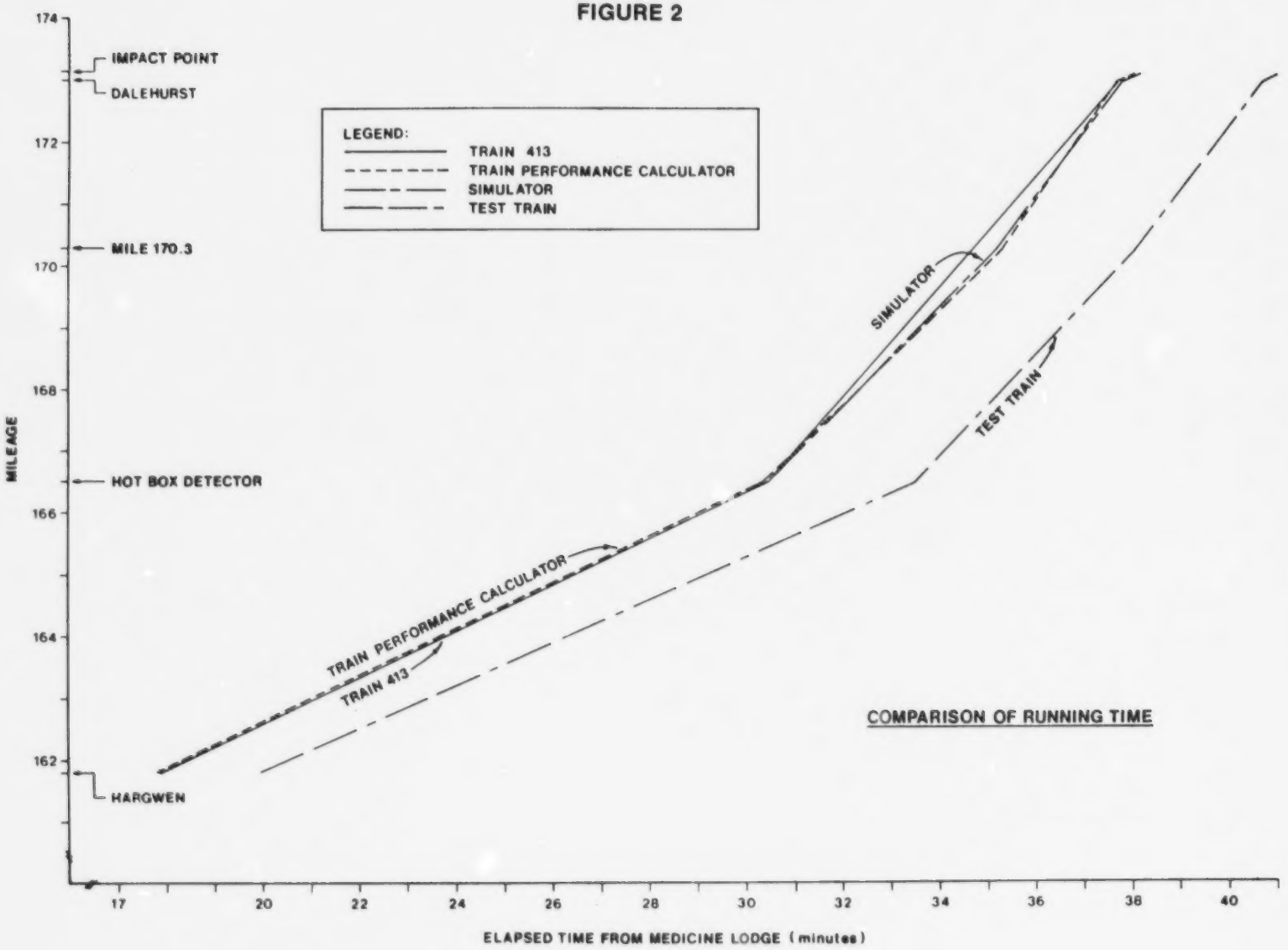
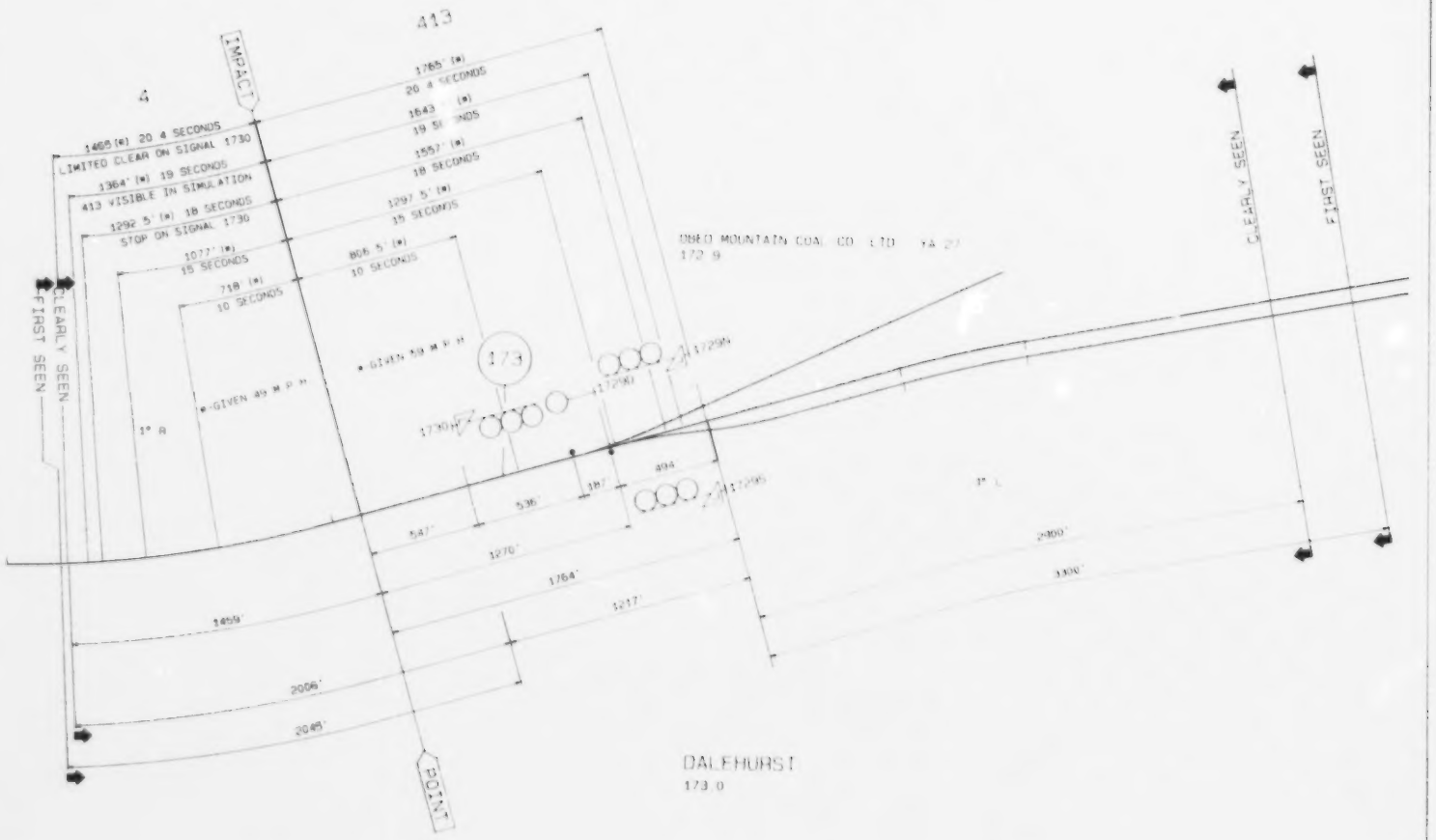

LEGEND:
TRAIN 413
TRAIN PERFORMANCE CALCULATOR
SIMULATOR
TEST TRAIN
IMPACT POINT
DALEHURST
MILE 170.3
HOT BOX DETECTOR
HARGWEN
MILEAGE
174
172
170
168
166
164
162
SIMULATOR
TEST TRAIN
TRAIN PERFORMANCE CALCULATOR
TRAIN 413
COMPARISON OF RUNNING TIME
17
20
22
24
26
28
30
32
34
36
38
40
ELAPSED TIME FROM MEDICINE LODGE (minutes)

FIGURE 3

LINE OF SIGHT AT MILE 173.13



b) Train 4

A Train Performance Calculator exercise using the information relevant to Train 4 was also done by CN and it indicates that at Pedley West, the last station which Train 4 passed, 4.7 miles west of the point of impact, Train 4 would have been going approximately 58 miles per hour. At that speed, a minimum brake application, up to 15 seconds before impact, would have been necessary to slow the train to 45 miles per hour by the time it reached the Dalehurst switch. If such a brake application took place, the speed of Train 4 at impact would have been about 49 miles per hour.

However, as mentioned previously, none of the survivors of the crash who were on Train 4 recall that there was any brake application. The vacationing running crew member, passenger John Raistrick's recollection is that prior to the impact the train was moving at about 50 miles per hour.

It appears that the speed of Train 4 was probably 58 miles per hour but certainly was not less than 49 miles per hour at impact.

2. Braking

The evidence does not indicate that there was any emergency application of the brakes of Train 413 prior to collision. Conductor Smith says he did not initiate one and did not feel one prior to impact.

Occasionally evidence of an emergency brake application will appear on the wheels of the train. Wheels recovered from the wreckage did not show any such evidence. Even the emergency application which must have occurred automatically as the result of the impact left no marks on the wheels. The absence of such evidence on the wheels therefore does not assist in determining whether there was or was not an emergency application.

The evidence regarding the speed of Train 413 discussed above supports the conclusion that there was no service application of the brakes at any time after Train 413 passed the hot box detector. Smith's evidence that he thought there was a brake application in effect when he called for the indication of the approach signal is incompatible with the results of the simulations and test train exercise. As stated previously, the Commission is unable to rely on Smith's evidence in this regard. The Commission therefore concludes that there was no brake application of any kind on Train 413 prior to impact.

On the basis of the testimony of several passengers and the surviving Train 4 running crew members the Commission also concludes that there was no brake application on Train 4 prior to impact.

3. Actions of the Crew of Train 413

How could the crew in charge of Train 413 allow it to exceed the track speed? Why were the signals ignored? Why was there no brake application?

The only direct evidence available to the Commission as to the activities of any of the three members of that crew immediately prior to the collision was the evidence of Conductor Smith which has been described and assessed above. It is however, possible to make deductions from other evidence.

As to the activity of the two members of the crew who were positioned in the lead locomotive about all that can be said with certainty is that they did not exercise control over the train. This is demonstrated by the fact that the train passed two restrictive signals without response, ran through a switch lined against it, significantly exceeded track speed for about five miles and was not subjected to any brake application prior to the collision.

The question of what events in the cab of the lead locomotive resulted in the failure of the crew members stationed there to exert control over the train is one over which all who participated in this Inquiry have agonized. The possibilities are relatively few. The failure to exert control over the train was either deliberate, or the result of inattentiveness or physical incapacity.

The Commission will set out its analysis of the available evidence relating to each of these possibilities. But first certain possible contributory factors can be eliminated from consideration.

a) Alcohol or Drugs

The Assistant Chief Medical Examiner for the Province of Alberta, Dr. Derrick Pounder, performed tests on the remains of Engineer Hudson and Trainman Edwards to determine, amongst other things, whether there was any indication of the presence of alcohol or drugs. Those tests established beyond doubt that neither of them was under the influence of alcohol or drugs at the time of the collision.

The conduct of Conductor Smith after the collision, in particular the efficiency of his dealing with the dispatcher, the surviving crew of Train 4 and those who came to render assistance, allows the Commission to conclude that his conduct was not affected by drugs or alcohol.

b) Position of Hudson's Remains

The suggestion was advanced by Counsel that the location in which the remains of Engineer Hudson were found after the collision might be taken as indicating that he was not in his seat at the time of impact. The whole of the evidence however, renders this possibility remote.

The interior layout of the cab of Engine 5586 is depicted in Figures 4 and 5. In front of the locomotive engineer's seat and a few steps down from the floor on which the seat is positioned, is a small toilet room. Hudson's remains were found against the material which had formed the upper forward corner wall of this room. The suggestion was that this indicated that at the time of the collision Hudson was in the toilet room and not in his seat.

However, the engineer's seat and other equipment normally located near it, the deadman's pedal, the fire extinguisher and the hot plate, were also found in the same area as Hudson's remains and the entire wreckage of the cab was upside down.

The course of events which seems most probable is that the section of the cab in which the toilet compartment is located was pushed into the engineer's seating area so that when the cab turned over, Hudson's remains and the equipment mentioned above fell onto the portion of the toilet room wall which was, by that time, underneath it.

If indeed Hudson had left his position, it seems improbable that he would have done so without ensuring that Edwards was alert.

The Commission is therefore satisfied that the evidence does not support the conclusion that Hudson was anywhere other than in his seat at the time of the collision.

FIGURE 4

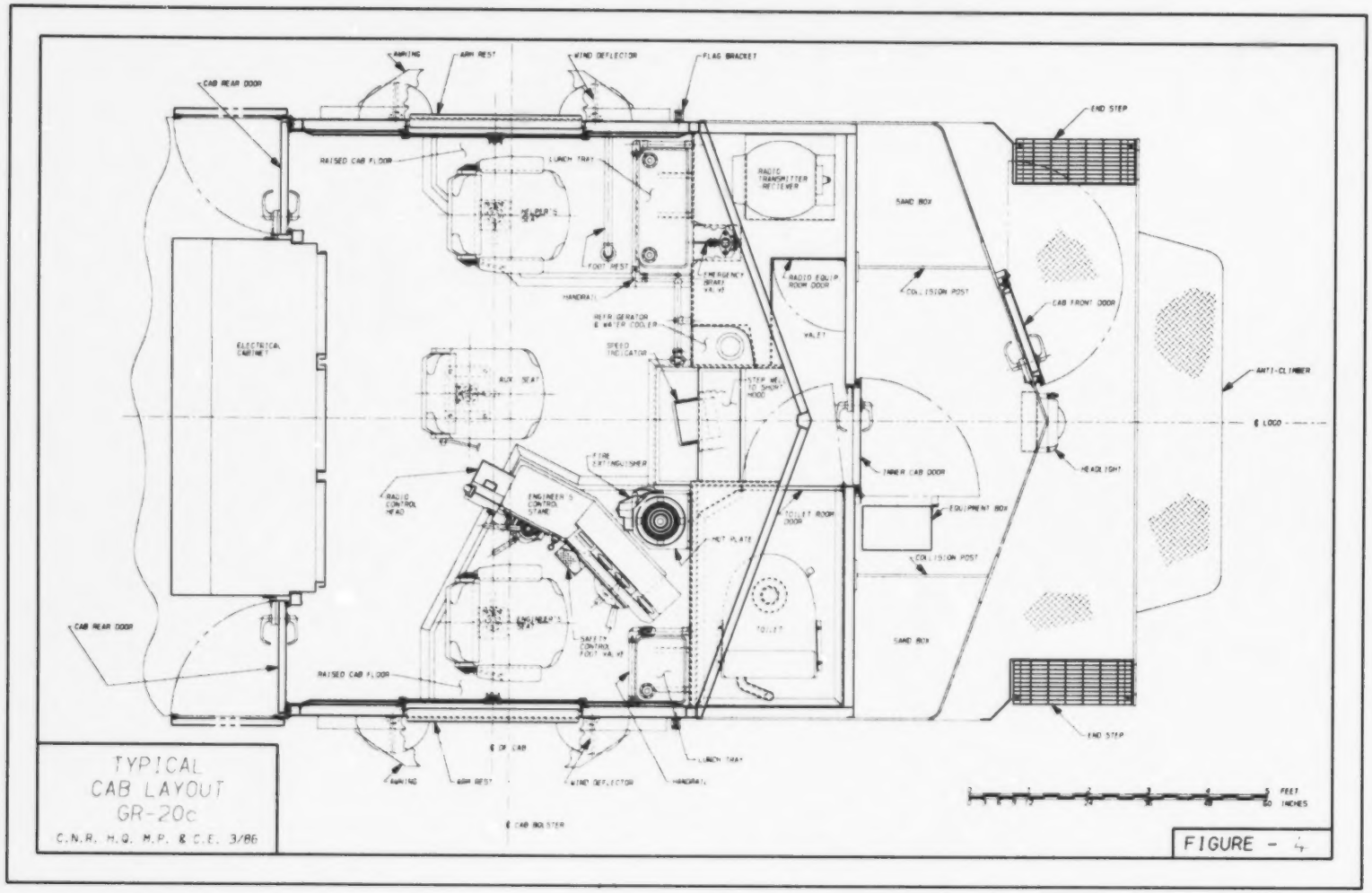

CAB REAR DOOR
RAISED CAB FLOOR
ELECTRICAL CABINET
RADIO CONTROL HEAD
ENGINEER'S CONTROL STAND
SAFETY CONTROL FOOT VALVE
CAB REAR DOOR
RAISED CAB FLOOR
LUNCH TRAY
FOOT REST
HANDRAIL
REFRIGERATOR & WATER COOLER
SPEED INDICATOR
AUX SEAT
FIRE EXTINGUISHER
TOILET ROOM DOOR
SET PLATE
TOILET
RADIO TRANSMITTER RECEIVER
RADIO EQUIP ROOM DOOR
VALET
STEP RE TO SHORT HOOD
INNER CAB DOOR
SAND BOX
COLLISION POST
EQUIPMENT BOX
COLLISION POST
SAND BOX
END STEP
CAB FRONT DOOR
ANTI-CLIMBER
℄ LOCO
HEADLIGHT
END STEP
AWNING
ARM REST
WIND DEFLECTOR
FLAG BRACKET
AWNING
ARM REST
WIND DEFLECTOR
HANDRAIL
LUNCH TRAY
℄ OF CAB
℄ CAB BOLSTER
FEET
INCHES
TYPICAL
CAB LAYOUT
GR-20c
C.N.R. H.Q. M.P. & C.E. 3/86
FIGURE - 4

FIGURE 5

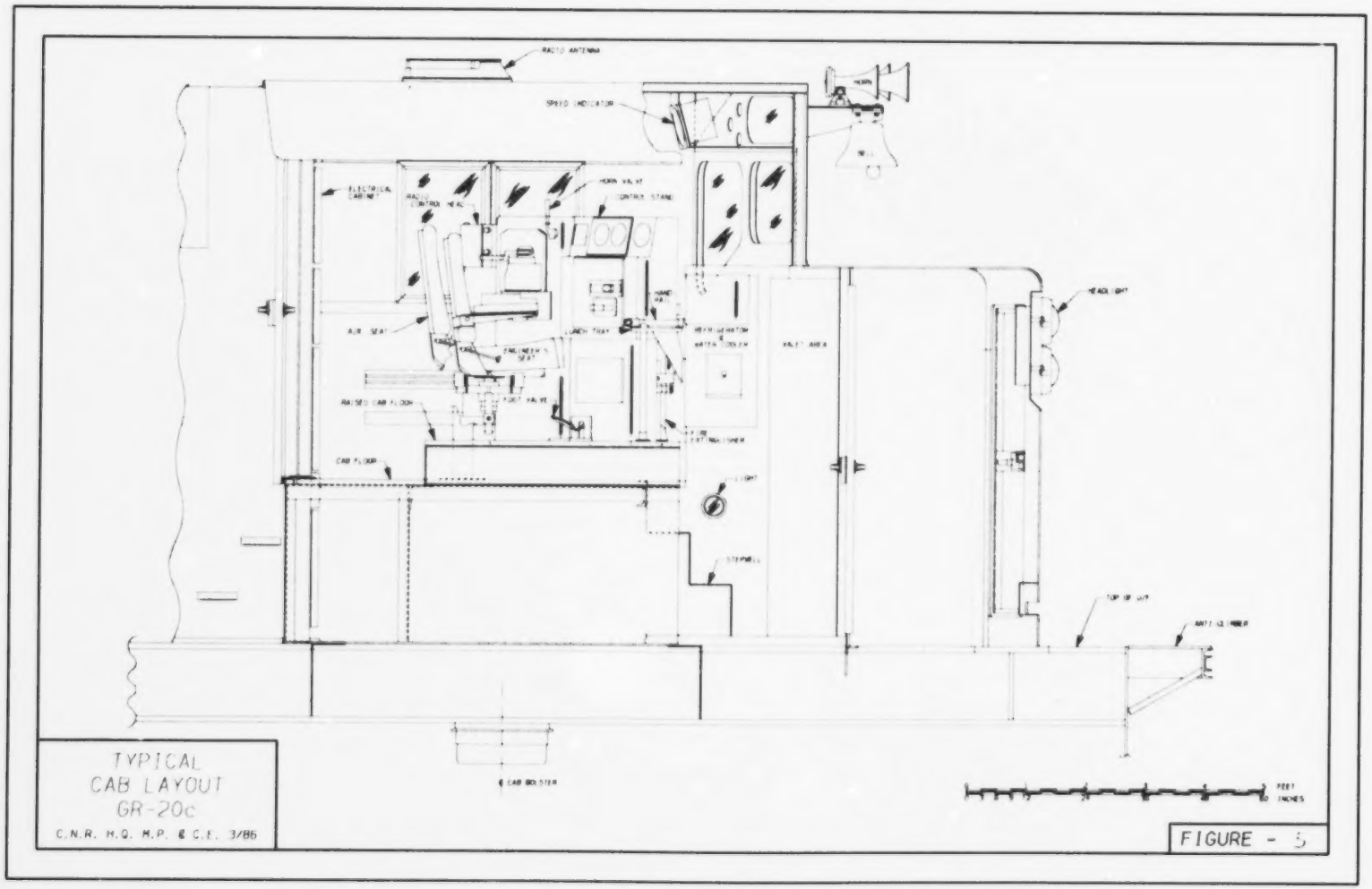


FIGURE 6

4. Actions of the Crew of Train #4

CN's analysis of the events in the few seconds prior to the collision indicates that for almost 19 seconds prior to impact each train was visible from the other. When Train 4 first came into the sight range of Signal 1730 that signal would have been permissive. But within a second or two it would have changed to red as a result of Train 413 passing through the Dalehurst switch.

Two passengers gave evidence indicating that they saw the red signal sufficiently prior to the collision that they would have had time to react by applying an emergency brake. One passenger recognized that Train 4 and Train 413 were on the same track and had time to yell out a warning to his co-passengers. None of these passenger witnesses felt any brake application prior to impact.

All of these points raise one of the most puzzling of the many mysteries of this collision. Why was there no emergency brake application initiated in the head-end of Train 4?

It is not possible to say whether an emergency brake application at the head-end of Train 4 would have made any difference to the magnitude of the collision. All that can be said is that the front-end crew were either in a state of frozen shock as they saw the freight train approaching, or were not looking forward so that they did not know that the freight train was approaching . The Commission is satisfied however that there was no action that could have been taken by the head-end crew of Train 4 which could have avoided the collision.

E. Alertness of the crew members

One of the possible explanations for the fact that Train 413 was out of control when it arrived at Dalehurst is that one or more of the crew members must have been asleep or otherwise not alert. The Commission therefore examined the working schedules of the crew members and evidence as to the rest they had obtained.

1. Hours of Work/Rest

a) Engineer Hudson

Records of Engineer Hudson's hours of work indicate that after Christmas 1985 he was off work until January 2. He worked that day and then booked "off sick" until January 10. He worked every day from January 10 to the day of the collision except Sunday, January 12, Wednesday, January 22, Tuesday, January 8 and Sunday, February 2. On each of those days the record indicates he was available but not required.

From January 10 to January 17 Engineer Hudson worked on the Jasper west section taking trips from Jasper to McBride, British Columbia and back. From January 18 on he worked on the Jasper-Edson route. He completed 12 return trips between January 18 and February 8.

The one way trips between Jasper and Edson were in the range of 3 hours 45 minutes to 7 hours 50 minutes long. The layovers in Edson ranged from 0 hours to 6 hours. In the 30 days preceding the collision there were nine occasions when Hudson's time off duty away-from-home was less than 3 hours and on 5 occasions, there was no away-from-home time off duty at all. The layovers in Jasper ranged from 2 hours 25 minutes to over 24 hours. 9 of them were over 24 hours.

Hudson worked a total of 194 hours in the 30 days preceding the collision. The average time on duty each day was only 6.2 hours but there were great fluctuations either side of the average. The longest continuous time on duty was 14 hours 20 minutes on January 11. On January 26 the return trip to Edson occupied 15 hours 10 minutes with a 1 hour 20 minute layover in Edson.

Hudson had arrived in Jasper and gone off duty on Thursday, February 6 at 1630. He was therefore off duty for 25 ½ hours prior to departure for Edson on the evening of Friday, February 7.

It is assumed that he had a normal night's sleep on the night of February 6. The CN Jasper Station staff recall that Hudson was in the yard office and the crew booking office in the afternoon of February 7 to determine when he might expect to be called. The staff members who saw and spoke to him noticed nothing irregular about his appearance or behavior.

Hudson was assigned to Train 840 which left Jasper at 1815 on February 7 and arrived in Edson at 2250. He went off duty in Edson at 2320 and went to the Edson bunkhouse. There he had a 30 to 40 minute conversation with two engineers. Neither noticed anything abnormal about Hudson.

That conversation ended about midnight. No one saw Hudson go to the bedroom which he had booked in the bunkhouse. It is presumed however that he used the room because the cleaning staff reported that though the bed was not completely disturbed, someone had laid on the bed during the night and used the extra blanket provided in the room.

Engineer Hudson was next seen in the bunkhouse kitchen at about 0400. He was washing dishes which indicated that he had been up long enough to have prepared and eaten a meal.

The evidence therefore establishes that if he slept at all, Hudson had at the most 3 ½ hours sleep during the layover in Edson.

b) Trainman Edwards

The CN records relating to Trainman Edwards indicate that he had worked 18 days since the beginning of 1986. In that time he had completed 13 round trips between Jasper and Blue River, McBride or Edson. Prior to 11 of the trips he had in excess of 24 hours off duty before reporting to work and on the other two occasions he was off duty approximately 17 hours.

On five trips Trainman Edwards had no layover in the away-from-home terminal. On the remaining eight trips the layovers had ranged between 30 minutes and 12 hours 25 minutes. His longest uninterrupted time on duty was 13 hours 5 minutes and on January 16 the return trip to Blue River occupied 17 hours 55 minutes with a 1 hour 45 minute layover in Blue River.

Trainman Edwards' work record for the year preceding the accident indicates that January 1986 was a typical month. There were months in which he worked many more hours, particularly April and May 1985. His last vacation had been in February 1985.

Prior to February 7, Trainman Edwards had last worked on Tuesday, February 4. In his days off duty he had received a cut or scratch to his cheek while playing hockey which was remarked upon by most of the CN staff with whom he had contact on February 7 and 8.

Prior to departure for Edson on February 7, Smith asked Edwards whether he expected to be taking rest in Edson. Edwards indicated that he was not feeling well and that he could use a good sleep. Smith said that Edwards seemed fit for work. Notwithstanding the fact that Edwards admitted he was not feeling well and required sleep, he apparently judged himself fit for duty and went to work.

The autopsy done on the remains of Trainman Edwards revealed inflammatory changes in the liver and lungs which the medical examiner considered to be "consistent with, but not diagnostic of, a generalized viral infection such as a flu like illness".

On arrival in Edson, Edwards asked the station staff when he might expect a return trip to Jasper. He was told that it would be at about 0300 or 0400. He did not book rest but went to the bunkhouse, had a short conversation with the employees who were there and went to bed. This would have been at about 2330. Bunkhouse staff advised that the bed in Edwards' room had been used.

Edwards had asked that he be given a call 1 hour before he was to be on duty. When the operator called his room on the intercom at 0445 he was not there. He was already in the bunkhouse kitchen.

It therefore appears that Edwards at best had the opportunity for less than 5 hours sleep during the Edson layover.

c) Conductor Smith

Conductor Smith had worked almost exclusively on the Jasper-Edson route since mid-June 1985. From January 1, 1986 to the date of the collision he had completed 22 tours of duty. 18 of

those tours were return trips to Edson and 4 were trips beginning and ending in Jasper without an intervening away-from-home terminal. Prior to 13 of the 22 tours, Conductor Smith had a layover in excess of 24 hours in Jasper. On 7 of the remaining tours the layover exceeded 15 hours.

On one occasion Smith made a trip to Edson and back in 14 hours 30 minutes with a 1 hour 45 minute layover in Edson. This was followed by a 1 hour 45 minute layover in Jasper and a 10 hour 10 minute return trip to Edson which included a 1 hour 5 minute layover in Edson. Those two return trips, which occurred on January 15 and 16, occupied 26½ hours of which time Smith was on duty 21 hours 55 minutes.

On January 27, on one of the tours beginning and ending in Jasper without interruption, Smith was on duty continuously for 18 hours 30 minutes.

Smith had taken the train to Edson on Thursday, February 6, arriving there at about 1500 hours. He was released to deadhead back to Jasper at 2100 on a freight train leaving at that time but he actually stayed overnight in Edson, and took the bus back to Jasper arriving at 1100. He did odd jobs around town in the afternoon and reported for work at 1600.

Upon arrival in Edson on February 7, after completing his duties, Conductor Smith went for coffee with the operator at about midnight. He remained at the operator's apartment when the operator returned to work. He said he slept until 0515 and was awakened after a telephone call from the station called him to work at 0545.

Smith's evidence was that he had approximately 3 ½ to 4 hours sleep that night.

d) Engineers Miller and Peleshaty

It is of interest to compare the work hour records of Engineers Miller and Peleshaty to those of the crew of Train 413. There is a stark contrast.

The routine for engineers in passenger service was that they worked 2 days and then had 1 day off. In the month preceding the collision both Miller and Peleshaty had worked according to that routine.

Miller had worked on Friday, February 7 and arrived back in Jasper at 2035. Sunday, February 9 was to have been his day off. Peleshaty had not worked on Friday, February 7. Both engineers were called to duty by telephone on the morning of February 8, one hour before they were to be on duty.

2. Observations of Co-Workers

All of the Train 413 crew members came into contact with many other CN employees in the Jasper station and in Edson. Edwards and Smith were also seen by members of the crews of the two trains that they met at Medicine Lodge.

Two of the employees who saw Hudson said that they observed a redness or purplishness in his face. However, he seemed in good spirits and his conduct was normal. This alleviated any concern these two employees might have had. Another contact when asked about this said that Hudson always appeared to have a red face.

None of the contacts noticed any irregularity in the behavior of any of the crew members. Apparently Edwards mentioned his need for a good sleep only to Conductor Smith.

3. Ergonomic Considerations

In order to determine whether the evidence regarding the hours of work and rest of the Train 413 crew had significance to their alertness prior to the collision, the Commission retained Dr. Alison Smiley, a Canadian expert in the science of "ergonomics". Ergonomics is defined in Webster's Dictionary as:

> . . . an applied science concerned with the characteristics of people that need to be considered in designing and arranging things that they use in order that people and things will interact most effectively and safely.

Dr. Smiley examined the work records of the crew members, particularly those of Engineer Hudson and also considered other statistical information which was obtained from CN regarding the work hour patterns of running crew employees. She rode in the engine and on the caboose of a train from Edmonton to Edson on a particularly blizzardy March night. She had opportunity to engage in conversation with the crew members on that trip.

Dr. Smiley identified several features of Hudson's work/rest schedule which led her to conclude that Hudson was not adequately rested and possibly was not alert prior to the collision.

a) Erratic Schedule

The first feature of Hudson's work pattern which impressed Dr. Smiley was its erratic nature. The chart which forms Appendix 4 to this Report illustrates this point.

Such a schedule would, in Dr. Smiley's opinion, have produced in Hudson a state of chronic fatigue. This would result from the desynchronization of his "circadian rhythms" and from an accumulated sleep deficit.

The phenomenon of circadian rhythms requires some explanation. Various bodily functions such as body temperature, heart rate, blood pressure, adrenalin production, physical capacity and mental alertness fluctuate in a cycle of 22 to 25 hours depending on the individual. The rhythm of the cycle is maintained and the various fluctuating functions are sychronized throughout the cycle by influences external to the body such as changes from daylight to darkness, social contacts, hours of work, and knowledge of clock time.

Studies on this subject have established that when an individual's circadian rhythms are synchronized, the cycle for mental alertness peaks in the daylight hours. Psychological and physiological work readiness are at their maximum in the morning and in the second half of the afternoon. The cycle is low in the early afternoon and also late at night, particularly around 3:00 a.m.

When an individual's job requires periodic changes of shift, for example from two weeks on days to two weeks on nights, the change will effect the gradual shifting of his circadian rhythms, but the shift will never be absolutely complete. This, combined with the fact that the quality of sleep obtained during the day is significantly lower than that of sleep obtained at night, results in a shift worker building up a sleep deficit over the period of night shift work. He sleeps longer on days off following a night shift than he does following a day shift.

The disturbance of circadian rhythms caused by regular shift work produces chronic fatigue and other negative health effects.

This effect is more pronounced when the shift work is irregular or erratic. Hudson's hours of work pattern had been so erratic for the month preceding the collision that Dr. Smiley was confident in concluding that he would have been in a state of chronic fatigue.

b) Unpredictable Work Hours

A feature of the work assignment system which is described in detail on page *xxx*, is that crews do not know with certainty when they will be on duty until two hours before they are to report. Some employees are able to predict when they will be called. These predictions are frequently quite accurate but not to such a degree that they could be considered reliable.

The effect of this feature is that an employee may plan the use of his off duty hours in a certain way only to have those plans frustrated by an unexpected call to duty. He may be called to work not having had sleep he had planned to have or having had it so long before being called that he soon will be in need of sleep again.

Employees working in such a system will often be called to duty when they are insufficiently rested. Frequent recurrence of such incidents over a period of a few weeks will contribute to both the rest deficit and the chronic fatigue produced by the erratic nature of the hours of work pattern. As Hudson had been working in this system for the month preceding the collision, it is reasonable to expect he was experiencing this effect.

c) Long Shifts

The Commission requested and received from CN information as to the hours worked by 75 crew members in January 1986. This information was analyzed by Dr. Smiley.

The sampling revealed that 3 of 21 engineers whose hours were examined had average shift lengths of 12.27, 14.23 and 14.83 hours. About one-third of the shifts of a group of 15 engineers exceeded 12 hours. 8 of 21 engineers showed at least one shift of 16 hours or longer during January. The most shocking instance was a freight engineer who on one occasion worked 21.25 hours continuously and then after 3 hours off duty proceeded to put in a shift of 20.75 hours.

These records led Dr. Smiley to have great concern about the capacity for vigilance of these crew members. She advised that vigilance studies have shown that people are not able to maintain a constant state of alertness after one-half hour, let alone after 20 hours or even 14 hours.

She brought to the attention of the Commission a report done by the Canadian Institute of Guided Ground Transport in 1974 which contained the following conclusion:

> The work hours of railway crewmen are both too variable and lengthy to result in anything but sub-optimal vigilance under certain conditions, particularly in the case of returning freight trains.
>
> McGaughey, T.T., Michaut, G.M.E., and Wilde, G.J.S., *Work Rest Schedules and Vigilance Problems of Railway Operating Personnel*, Canadian Institute of Guided Ground Transport, 1974.

Dr. Smiley's observations and analysis of work records led her to emphatically agree with that conclusion.

d) Sleep on Night of February 7

Though each of the crew members of Train 413 had experienced long shifts during the five weeks preceding the collision they were not in the course of a long shift at the time of the collision. However, Dr. Smiley was of the view that the sleep they had obtained on the night of February 7 was so short as not to effect an improvement of their vigilance capacity.

The evidence revealed that if they slept at all, Hudson had a maximum of 3 ½ hours sleep, Smith, 4 hours and Edwards, who had acknowledged a particular need for sleep, 5 hours. Given the erratic nature of their work records, the fact that Hudson and Smith were probably experiencing chronic fatigue, and the fact that Edwards was fatigued by reason of "a touch of the flu", none of the crew members could be considered to be well rested for their return journey on February 8.

4. Conclusions

The Commission accepts the evidence of Dr. Smiley and concludes that none of the members of the crew of Train 413 had adequate rest prior to setting off for Jasper on the morning of February 8. The evidence establishes to the satisfaction of the Commission that the condition of these crew members was such that the failure of any one of them to retain or exert control over the train may have resulted from inattentiveness owing to fatigue.

In the case of Trainman Edwards, this conclusion seems to be the most likely explanation for his failure to apply the emergency brake. Nothing else in the evidence raises any other reasonable possibility. The Commission considers it extremely unlikely that Trainman Edwards' omissions were intentional.

The factors that led to the crew of Train 413 being inadequately rested can be viewed as forming two groups. First are those factors which derive from the policies and procedures regarding rest. Second are those factors which derive from the policies and procedures regarding the scheduling and assigning of work. It is appropriate to consider these policies and procedures further.

5. Work/Rest Rules

a) The Present Regime

i) Collective Agreement Rest Provisions

The provisions of the Collective Agreements relating to rest which were in force at the time of the collision and those currently in force are set out in Appendix 5 of this Report.

Crew members have the right to book rest when going off duty. Locomotive engineers may book between 6 and 24 hours rest at their home terminal and between 1 and 8 hours rest at an away terminal. The other crew members may book between 3 and 24 hours at the home terminal and between 3 and 8 hours at the away-from-home terminal.

In addition, after 11 hours on duty, or 10 hours where there is a reduced crew, crew members have the right to book rest en route – after giving notice, and subject to certain conditions.

When rest has been booked management cannot generally require an employee to work except that the UTU Agreement provides that if there is a shortage of trainmen, and train delays would otherwise occur, a trainman can be called to work after 16 hours rest. (Before February 11, 1986, this was 10 hours). A similar exception in the collective agreement affecting locomotive engineers was deleted as of February 11, 1986. With unconcealed pride, witnesses giving evidence to the Commission referred to these amendments as evidence of progressiveness.

ii) Rest at the Away-from-Home Terminal

The evidence presented to the Commission established that it is rare for running crew members to exercise their right to book rest when they are at the away-from-home terminal.

Many factors were cited to explain this phenomenon. Probably the strongest influence against booking rest at the away-from-home terminal is the natural and understandable preference to take one's rest in one's own home.

In addition, aspects of the rest "rules" discourage the booking of rest in the away-from-home terminal. For example, by the terms of the UTU Collective Agreement, all of the train crew other than the locomotive engineer (that is, the crew in the caboose and the front-end trainman) are tied together as far as rest in the away-from-home terminal is concerned. If one books rest, the others are required to remain off duty during that period of rest. This aspect of the rules produces considerable peer pressure on individual crew members not to book rest as other members of their crew usually do not wish to be "tied up" in the away-from-home terminal.

Some of the crew members who gave evidence to the Commission denied that such peer pressure would ever affect them if they felt they needed rest. The same crew members did, however, observe that they rarely if ever booked rest in the away-from-home terminal.

CN officials acknowledged that the effect of this rule is to make the taking of rest in the away-from-home terminal a "consensus decision". Allowing the determination of whether rest will be taken to be made on the basis of consensus is surely a lapse in the usually rigid acceptance by management of the fundamental principle upon which the work/rest regime is founded – a man is the best judge of his own condition. That principle is discussed further below but it may be observed at this point that this lapse constitutes an undoubtedley unintended acknowledgement of the fundamental inadequacy of that principle.

Another factor influencing the reluctance to book rest at the away-from-home terminal is that a crew member who has booked rest will not be eligible to be deadheaded home if management determines that there is an excess supply of crew members in the away-from-home terminal.

A further discouragement to the booking of rest at the away-from-home terminal is the fear that if rest is booked, the crew will lose its turn on the pool list, the operation of which is described below, and when they eventually return to the home terminal, they will find their names below the names of crew members who formerly were behind them. Losing place on the home terminal list is referred to as being "scooped". Crews are reluctant to book rest away-from-home for fear of being scooped by crews otherwise behind them.

The Commission was also advised that Jasper crew members find the conditions in the bunkhouse not conducive to good sleep. In particular, they complained that the intercom used to call crew members to duty wakes up not only the crew member called but also crew members in rooms in the same part of the bunkhouse.

iii) Mileage Maximums

The Collective Agreements establish limits to the amount of work (expressed in miles) that running crew members are allowed to do in a month. For locomotive engineers in freight service, the limit is 3,800 miles per month. For trainmen in freight service it is 4,300 miles. The main reason for these provisions seems to be to ensure that the size of the employee pool from which train crews are called is maintained at a level which will ensure a reliable level of work and income to those in the pool. If traffic is such that the employees in the pool cannot make their miles, those with least seniority are removed from the pool. If traffic is heavy and the employees in the pool cannot handle it and stay within the limit, more employees are added to the pool.

The evidence of most running crew members who appeared before the Commission was that the permitted mileage can be achieved in a month through reasonably steady work. Each employee's month for the purposes of the mileage limit starts on a different day to ensure a steady supply of crew members throughout the month.

Hudson's mileage month commenced on the 26th of the month. As he had worked only one day in the first half of the mileage month commencing December 26, he had accumulated only 2,834 miles when the new month began on January 26.

Accumulating on that total, he reached 3,800 miles on January 31 but because he had begun a new accumulation on January 26, the rules permitted him to continue working. Accordingly, in the 30 days preceding the collision, he had accumulated a total of 4,834 miles – 1,034 miles more than contemplated for a 30 day period in the maximum mileage provisions.

If the normal operation of the monthly mileage limit has any safety benefits, even unintentional, those benefits were lost in Hudson's case during the months of January and February 1986.

iv) Pay System

The system governing the taking of rest must be considered within the context of the pay system.

The details of the pay system are complicated. Previous independent inquiries that have had occasion to study those details have commented upon the difficulties which they encountered and the incompleteness of the understanding which their efforts produced.

Previous independent inquirers did however, derive some comfort from their observation that the Company and Union officials who regularly work with the details of the system appear to understand them. This Commission obtained no such solace from this observation. Having studied the pay system and the nature of the details it contains, this Commission is satisfied that those details do not hide and could not affect the accuracy of conclusions it has made regarding basic principles of the pay system.

The system by which payment to running crew members is calculated is often called the "dual system of pay" or the "two tier system of pay". The duality of the system is produced by the fact that both distance travelled in miles and hours on duty are taken into account in the calculation of pay.

The collective agreements state rates of pay in cents per mile. An employee reporting to work cannot be paid for less than 100 miles regardless of how far he travels. However, in order to

ensure that proper compensation is given when a train movement takes longer than normal, payment is calculated on an hourly rate where that would produce greater compensation than the mileage rate.

In order to coordinate the mileage calculation and the hourly calculation, the minimum daily mileage is assumed to equal 8 hours' work. Accordingly, the hourly rate is one-eighth of the daily minimum compensation produced by the mileage rate.

Therefore, if a 100 mile trip takes less than 8 hours, the employee is paid on a mileage basis. If the trip takes more than 8 hours, he is paid on an hourly basis.

An illustration of the operation of the system given by Commission Roy A. Gallagher, Q.C. in the course of the report of his Commission of Inquiry in October, 1972 is useful:

> To give a simple illustration of the manner in which the dual system of pay operates, let us take a hypothetical run of 125 miles. In freight service the basic rate of pay is specified for a day of 8 hours or 100 miles. The hourly rate is 1/8 of the basic daily rate. The mileage rate is 1/100 of the basic daily rate. (Thus, in any tour of duty where the miles run are less than 100, a minimum of 100 miles is paid).
>
> The standard speed for the determination of overtime is 12 ½ miles per hour - – that is 100 miles divided by 8 hours. (The employee is protected against his time on duty being excessive in relation to the miles run since he will be paid on the basis of miles or hours whichever is more beneficial to him).
>
> In the example of a run of 125 miles, the normal time allowed to complete such a run would be 10 hours – - 125 divided 12 ½. If the employee concerned completed this run in 6 hours he would be paid on the basis of miles as this would obviously be more favourable to him. Six hours at the standard speed would only amount to 75 miles. If, however, the employee completed the run in 12 hours he would be paid on the basis of 12 ½ miles per hour for the first 10 hours worked, and at the overtime rate for the last 2 hours as this would be more favourable.
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> *Report of the Commission of Inquiry into the Employment Practices relating to the "Running – Trades" Employees in the Railway Industry in Canada under Federal Jurisdiction, (Gallagher Report)* Roy A. Gallager, Q.C., Commissioner, October, 1972, p.10.

In addition to payment for actual time on the road, the collective agreements provide for payment for other items including time on duty before departure, time on duty after arrival, time delayed en route, time delayed in the away-from-home terminal after 12 hours off duty. There are many other situations in which additional payment on a time basis is made.

Commissioner Gallagher made the following observation regarding this system of payment:

> Essentially the dual system of pay is an incentive system containing components relating to miles run and hours worked. The purpose of the incentive system is, of course, to get the employee to move the train over the road as quickly, efficiently and *safely* as possible. [Emphasis added]
>
> *Gallagher Report*, p.9, para. 171

It is not apparent how the pay system promotes safety. Aspects of it might be thought to encourage a degree of recklessness in the operation of trains. There is no monetary disincentive to moving the train over the route as quickly as possible. Completing a 100 mile trip in less than 8 hours gives the crew time off with pay.

However, it should be observed that the incentive to move quickly over the route is not financial. Also there is no disincentive to moving the train carefully and perhaps slowly. Crew members are paid for whatever time the trip takes if it exceeds the normal time. However, this pay system, unlike those used in most industries, does not have a higher rate of pay for overtime hours.

Debate on whether the pay system of itself presents a net encouragement or discouragement to safe operations is probably not profitable. However, examination of the pay system in the context of operations on the Jasper-Edson route produces an interesting observation. In that part of the CN system, and probably in all parts, one of the basic assumptions of the pay system is regularly disproved in practice. The average rate at which a train moves over the route is far in excess of 12 ½ miles per hour. The normal duration of the approximately 100 mile run between Jasper and Edson is something in the area of 4 or 5 hours. This is substantially less than 8 hours and the total duration of a return trip, assuming no layover, is 9 or 10 hours, which is a reasonable working day.

Accordingly, the combination of the pay system and the average duration of a trip, makes it possible for running crews to endeavour to complete two days work in one day. Often they succeed.

The records produced to the Commission and the evidence of many of the running crew members who appeared established that a very common pattern is for Jasper employees to work one day on the road and take the next day off. Where they are sufficiently fortunate to have a normal run both ways without an extensive layover in Edson, they can expect to be finished work within 12 hours. They will be paid for at least 16 hours and can earn a "normal" income even though they take 24 hours or more off duty at home.

It was clear to the Commission that a majority of the running crew members who gave evidence on this subject are pleased that the system accommodates this one day on – one day off regime. The Commission is convinced, however, that the maximization of at-home off duty hours which the system facilitates is achieved at the cost of vigilance in the operation of trains.

A completely normal run in both directions with no layover in Edson is an infrequent event. There are countless influences that can cause the run in either direction to be much longer than "normal". The layover in Edson is frequently of several hours duration. Accordingly, crew members working in the one day on, one day off regime often experience a very long working day. This produces the pattern of long shifts observed by Dr. Smiley and gives rise to a vigilance deficiency at least on the return trip.

The Commission's study of the pay system leads it to agree with the conclusions drawn by an American Presidential Study Commission which consisted of officers of the United Transportation Union, officers of the railroads and an independent chairman. Among the conclusions of that Commission in its report dated December 8, 1983 are the following:

1. The pay system has not kept pace and is inconsistent with the times.

2. It is an unnecessarily and overly complicated and complex basis which has produced much distortion in earning levels and pay relationships.

3. The complications and complexities thereof are further compounded by the proliferation of arbitrary and special allowances to which increases are generally applied.

4. Additionally, the basic pay system has not kept pace with the environmental realities surrounding its applications, i.e., the 100 mile day and the average speed basis of through freight continuing to remain at 12 1/2 miles per hour in spite of the fact that through freights are operating at an average of over 20 miles per hour.

5. The "eight hours or less", as a measurement of a day's work is an anachronism. The measurement should be more reasonably and realistically relevant to the hours that one actually works or is on duty.

6. The present basis of pay system has been reviewed and reviewed by many public bodies, including several Emergency Boards, including Nos 194 and 195, and by the Presidential Railroad Commission. All of these recognized and recommended a need to change and update the system. Thus, there is clear proof positive as to the need for an updating of the system to meet the current times.

7. There is no reason logical, legal, moral, or otherwise, to perpetuate the present system as it is, for the "unborn child" and persons not yet employed.

Report and Recommendations of the UTU Study Commission Established by the Signatory Parties to the October 15, 1982 Agreement, December 8, 1983, p. 155

v) Existing Government Regulation

On July 1, 1965 the Canadian Labour (Standards) Code came into effect. This established rules regarding the maximum hours of work in industries under Federal jurisdiction. These rules must be viewed as producing a significant safety effect in the industrial context whether or not that was the rationale for enacting them.

When the Code came into force, a deferment was granted to the railways. Running crews and other railway employees were exempted from the operation of the rules.

In February 1972 the deferment of the application of the rules to the railways was cancelled and the rules came into effect for some classes of employees. But the exemption was continued for employees in road and yard service, that is, the running trades. This exemption resulted from representations made by the railways and unions that the application of the rules to railway operations and its employees would be prejudicial, detrimental and incompatible with the existing wage structure and system.

The Federal Government appointed Roy A. Gallagher, Q.C. of Winnipeg, Manitoba as a Commission of Inquiry under the Canadian Labour Code to inquire into these concerns and make recommendations as to whether the Code rules should be applied to running trades and as to "the method which should be used to determine what are the hours of work of 'the running trade employees'".

Though he did not set out his reasons for doing so, the Commissioner concluded that at that time it would have been unduly prejudicial to the interests of employees and seriously detrimental to the wage structure system to require compliance with the Code restrictions.

He considered the railway management and the employees' unions to be the only parties sufficiently knowledgeable about their unique industry to devise changes and restrictions that

would be fair. He was unwilling to recommend the imposition of external controls in substitution for a structure that had been arrived at through many years of collective bargaining.

In his report however, he did implicitly recognize a deficiency in the system and stated:

> The Commission . . . recommends that the parties be required to continue in their joint efforts to find a solution to the problems they face so that the provisions of the Code can be applied at some time in the near future.
>
> *Gallagher Report*, p.23.

For the purposes of this Inquiry two observations are important. First, Commissioner Gallagher's analysis did not purport to include any consideration of the safety implications of the system. The word safety appears only once in his entire report. (The sentence in which it appears is quoted previously). It is clear that whatever considerations Commissioner Gallagher took into account in recommending no Government regulation of the hours of work of railway employees, those considerations did not include the safety implications.

Secondly, it is important to observe that Commissioner Gallagher recommended that the parties to his Inquiry be required to find a solution themselves. It does not appear that any such requirement was imposed nor that the parties without such a requirement have made any progress "toward finding a solution to the problems they face".

In his evidence before the Commission Mr. Robert Colosimo, CP's Vice-President for Industrial Relations acknowledged that since Commissioner Gallagher's recommendation was made in 1972, there has been no effort by the Unions or the railways toward finding the solutions which Commissioner Gallagher considered desirable.

This Commission is firmly of the view that the failure to seek such solutions in the 14 years since Commissioner Gallagher's report was issued is sufficient basis for concluding that the parties on their own simply do not have the requisite motivation to restructure the system. Society cannot rely on the railways or the unions to adopt modifications sufficient to eliminate the unsafe conditions which the present pay system fosters.

b) Fundamental Principle

The work/rest regime described above is founded on a principle, the fundamental correctness of which, as far as both management and the unions are concerned, is beyond question: "A man is the best judge of his own fitness and condition." This principle is explicitly enshrined in the provisions of the UTU Collective Agreement, Article 3.51 of which states, "a trainman will be judge of his own condition (sic)."

This principle assumes that employees can and will recognize when they are not fit for duty and that both their integrity and self discipline is such that they will forego the opportunity to earn income when they have made that assessment.

The inadequacy of the fundamental principle is strikingly demonstrated by the events of February 7 and 8. Trainman Edwards verbally acknowledged that he required sleep and that he was not feeling well. Yet he did not recognize this as making him unfit for duty. As the only reasonable explanation for his failure to employ the emergency brake ("pull the air") is that he was inattentive, probably because he was asleep, it seems clear that he either misjudged his condition or made no judgment about it at all.

It is not just the inadequacy of this principle that is of concern. It is also the level of reliance placed upon the principle by management, as demonstrated by the attitude taken to the subject of rest in the course of internal accident investigations.

When a statement is taken from a CN running crew employee who may have knowledge relevant to an accident, the subject of the adequacy of the rest he had prior to going on duty is invariably handled by one question and one answer. The questioner will either ask, "What rest did you have when you reported to duty" and receive the answer, "Adequate rest" or he will ask, "Did you have sufficient rest before reporting to duty" and the employee will answer, "Yes". The fact that this litanous exchange takes place shows that both employee and employer recognize that in all cases whether or not the employee has had adequate rest is at issue. However, the manner in which the inquiry is conducted renders the determination of that issue a charade.

Employees obviously know that they are responsible to ensure they have adequate rest. CN appears to be satisfied that notwithstanding the occurrence of an accident, their assessment of the adequacy of their rest is reliable both when they report for duty and after an accident.

The extent of the reliance placed upon the subjective judgment of train crews is further demonstrated by the form which engineers are required to sign on each occasion they report for duty.

All engineers when they book in, sign an Appearance Register at the top of which the following words appear:

> We, the undersigned, hereby certify that we have had sufficient rest, that we are in every way fit for duty, that we are properly acquainted with the section of the line over which we are about to run and that we have read all new notices and circulars on the notice board and in the bulletin book, and that we have a copy of all current working time tables governing the section of the line over which we are about to run.

Requiring the engineer's signature on that form is the only involvement CN management undertakes in ensuring that employees are fit when they report to duty. The events of the February 15th, 1986 collision at Trudel, Quebec, which the CTC investigated, established that signing this declaration on the Appearance Register has become a meaningless ritual.

There can be no doubt that CN has the ultimate responsibility for the condition of its crews. That it is willing to completely abdicate that responsibility to the employee whose condition is in question, is simply unacceptable. It places the employee in a situation of hopeless conflict. To expect him to be objective, to consider only his physical condition and to ignore his financial situation, the desires of his fellow crew members, his own personal preference for being in the comfort of his home, the effect which removing himself from duty will have on the time of his next call, and the potential disfavour of his supervisors, is simply to ask for more than can be expected.

In the Report of its investigation into the Trudel collision, the CTC observed:

> CN should accept the corporate responsibility to ensure its engineers are rested and otherwise fit to perform their duties.
>
> *The Trudel Collision*, Canadian Transport Commission, August 29, 1986, p.58

This Commission emphatically endorses this observation. It should not be possible, as it currently is, for running crew members to be able to report to work with virtually certain

confidence that they will not encounter a management officer. Some means of introducing a significant likelihood that such contact will occur must be introduced.

Just as the events of this collision establish that the exclusive reliance on the judgment of the employee himself as to his fitness for work is unacceptable, so too do they establish that reliance cannot be placed on the judgment of his fellow crew members. Smith knew of Edwards' need for sleep but did not exert his authority to require him to remain off duty.

Whatever improvements might be effected if management were to introduce a level of direct monitoring of the condition of running crew members when they report to work, the Commission does not believe such alterations would effect sufficient improvement. In the final analysis, it is simply not sufficient to rely exclusively on the assessment of the employee himself, or even on that assessment in combination with the assessments of his fellow crew members and management. Some external imperative which places no reliance on human judgment is necessary. The officers of the CTC who investigated the Trudel collision considered that the evidence regarding the work/rest habits of the running crew employees involved in that accident was sufficient to "require a comprehensive survey of CN and CP employee rest/work habits to ascertain the seriousness of this matter". (*The Trudel Collision*, page 59). The evidence before this Commission is sufficient to convince it that the matter is sufficiently serious as to require the introduction of a system of mandatory rest.

c) Recommendations – Rest

The Commission recommends that the Government take immediate steps to regulate the hours of work of running crew employees so as to ensure that acceptable levels of vigilance are likely to be maintained for the entire duration of each train movement. It is recommended that this be accomplished through a mandatory period of off-duty time. As a minimum, and until regulations can be formulated, the off-duty time should be no less than 10 consecutive hours in each 24 hour period. In addition, in each period of 168 hours (7 days) an employee should have an additional period of 48 consecutive hours off duty.

It will be necessary for the CTC or some other agency to determine the best form of regulation to give effect to this recommendation and to accomplish its orderly implementation. However, this Commission is convinced that it is not necessary for there to be any study undertaken as to whether such a regulation is required. The events at Dalehurst eliminate any question on that score.

The Commission recommends that the determination of the form of regulation which will replace the interim provision mentioned above, should be completed within 18 months.

The Commission contemplates that the interim measure it has proposed should be superimposed on the existing system by which crews can book rest when they consider they require it. It is not contemplated that there be any alteration of that part of the regime unless the permanent regulations which will be formulated include such alterations.

The Commission sees such regulation as eliminating exclusive reliance on the "fundamental principle" discussed above. It also sees such regulation as eliminating long shifts. It would force management to relieve an employee at the away-from-home terminal if it was not possible to assign him to a return run that would arrive in the home terminal in time to meet the off duty time requirement.

This recommendation, in combination with the recommendation made later in this Report to the effect that a maximum layover at the away-from-home terminal be 3 hours, would effect a significant pressure on management to give greater attention to the scheduling of train movements.

In their submissions to this Commission, the various interested parties presented arguments against the introduction of any form of "mandatory rest".

The representatives of labour had two main concerns. First, they feared that a mandatory rest regulation would result in a reduction in the earning capacity of employees. The type of the regulation recommended would not have such a result unless crews retain their present habit of working according to a pattern of one day on, one day off. If they do not abandon this practice their income will indeed be reduced. Under the proposed system they would be obliged to work about 8 hours a day, 5 days a week in order to maintain the same level of income they presently receive.

The second concern was that a mandatory rest regulation would create a requirement to take rest at the away-from-home terminal. This is certainly not part of the regulation the Commission contemplates. Crews might however be obliged to accept more frequent deadheading and the system of remuneration for deadheading would probably have to be altered so that the economic consequences to management of the proposed regulation would not be unreasonable.

The main arguments presented by management were first, that to impose mandatory off duty hours is not to ensure rest. "You can't compel a man to sleep". This observation is trite. However, the Commission believes that a regulation requiring a certain number of off-duty hours each day is more likely to result in employees receiving adequate rest than the present system.

Management also observed that "the current procedure, which has evolved over a long period of time, in parallel with changing standards of working hours in society, has served the railway and its employees very well". The Commission rejects this submission completely. The very fact that a collision occurred, which has given rise to this Inquiry, provides demonstration of the most convincing nature that the current procedure is inadequate to ensure a sufficient standard of vigilance. The submission ignores the public interest in safety. That interest is worthy of at least the same consideration as the economic interests of the railway industry and its employees.

The Commission received evidence from witnesses familiar with the systems in place in the United States, Britain and Australia in each of which mandatory rest is a feature.

In Britain, train drivers must take a minimum of 12 hours rest at the home terminal between time turns on duty. In Australia a trip from the home to the away-from-home terminal is generally further than it is in Canada so that each half of a return journey is in both theory and practice a full days work. There is a requirement of 8 hours off duty at the away-from-home terminal and 10 or 12 hours, depending on the railway, at the home terminal.

In 1907 the United States Congress enacted the Hours of Service Law which applies to railroad workers. The motivation for doing so arose out of the poor accident record of the American railways. That law as it has been amended provides that no employee engaged in train service may be required or permitted to work in excess of 12 consecutive hours. After working a full 12 hours, an employee must be given at least 10 consecutive hours off duty. If he has worked less than a full 12 hours, he must be given at least 8 hours off duty.

These examples demonstrate that the operation of railways within a system of Government regulated hours of work is realistic and practical.

Management observed that the countries that have mandatory rest can not be shown to have a better safety record. They have as many if not more accidents and by some systems of comparison the Canadian railways are considered to be safer.

The Commission's view is that these observations cannot be relied upon to support any relevant conclusion. The issue cannot be satisfactorily resolved by comparing accident statistics. The statistics do not reveal whether the accidents on the American systems resulted from vigilance inadequacies or from other causes. Neither do the statistics answer the compelling evidence which establishes clearly that the standard of running crew vigilance on Canadian railways is appallingly low.

CP provided statistics designed to impress the Commission that long shifts occur relatively infrequently in CP operations. This, they said, suggests that a mandatory rest regulation is not needed. These observations, however, give the Commission greater confidence in the appropriateness of its recommendation. For CP to observe that there are few long shifts is for them to acknowledge by implication that long shifts are undesirable. The events of the Hinton collision establish that the existence of any opportunity for an inadequately rested crew to be in control of a train cannot be tolerated.

It may be observed as well that the same observations made by CP to this Commission were made by it to the Gallagher Commission in 1972. Whatever effect those statistics might have had in the consideration of questions relating to the pay system, they cannot be of significance in the context of vigilance and safety. A system which contemplates any of its operations, much less 5%, running at less than acceptable vigilance standards is unacceptable.

The positions taken by both railways and both unions which appeared before the Commission establish clearly that this recommendation will be energetically opposed. It is an obvious understatement to observe that the Canadian railway industry has no will to change the system as recommended - substantial evidence to that effect is apparent in the utter absence of any effort toward improvement since the Gallagher Report. The Commission is convinced however that the public interest demands that these changes be imposed against the will of the industry and notwithstanding the energy of its opposition.

6. Work Scheduling

The Commission has concluded that 2 of the characteristics of the working schedule of the crew of Train 413 contributed to the members of that crew being in a state of chronic fatigue. These were the erratic nature of their hours of work and the unpredictability of both the time of a call to work and the duration of a work assignment.

Both of these characteristics are the product of a system by which work is assigned to freight crews. The Commission studied that system in order to ascertain how it is that it produces these undesirable characteristics.

a) The Work Assignment System

The crews for through-freight service like Train 413 are assigned from the through-freight pool. The pool consists of lists of crew members who are called to duty in the order that they

appear on the list. In the Jasper territory there are four such pools, one for each route emanating from Jasper (Jasper-Edson, Jasper-McBride, Jasper-Blue River, Jasper-Winniandy). In addition, there is a spare board which is a list of crew members not assigned to any one pool. When a vacancy occurs in any pool a crew member is assigned from the spare board.

Crew members are assigned to only one pool at a time and can apply to be moved from pool to pool. Transfers from pool to pool are made when there is a deficiency in the manning of a pool and are made on a seniority basis.

An individual crew member is placed at the bottom of the list of crew members in his pool each time he arrives at a terminal. Assignments are made from the top of the list so that each name gradually rises to the top.

If a crew member has booked rest, his name will rise through the pool nevertheless. If it rises to the top before the period of rest has expired, then the name is bypassed until the rest period expires. Unless rest has been booked, employees are subject to being called for duty on two hours notice.

It ordinarily takes considerable time for a crew member's name to rise to the top of the list at the Jasper Home Terminal. Generally a running crew member can expect to be off duty at the home terminal in excess of 12 hours and often in excess of 24.

At the away-from-home terminal, the list is much shorter than that in the home terminal. Accordingly, when a crew arrives in the away-from-home terminal, they can expect that their off duty time will not be as long as it would be in the home terminal. In the Edson terminal, a Jasper crew can commonly expect a layover of up to 8 hours and occasionally up to 12 hours. The rules are such that if a crew member is held over in the away-from-home terminal for 12 hours without being assigned, he is to be deadheaded back to his home terminal; that is, taken back to Jasper by motor vehicle on the highway or by a freight or passenger train and paid as if on duty.

Running crew employees exercise great diligence to determine when they can expect next to be called for duty. Lists of anticipated traffic are posted from time to time in the crew office of both Jasper and Edson terminals and many employees keep careful track of the proximity of their name to the top of the list. The staff in charge of crew assignments are consulted frequently by crews waiting to be called.

The available information as to the anticipated scheduling of departures is notoriously unreliable. Many of the running crew members who appeared before the Commission observed that frequently they might predict their call for a certain time, plan their off-duty hours accordingly and have those plans frustrated when the call comes much earlier or much later than predicted. Crew members said that this had been the subject of frequent complaints to management.

In passenger service crews are not assigned from a pool but hold a regular assigned run. This is possible because the passenger trains are scheduled. Running crews in passenger service work generally the same hours each day that they work.

Engineers Peleshaty and Miller, for example, would have been called for duty the same time each day – 0615. They would have departed on Train 4 for Edson at 0705 or thereabouts each day and arrived in Edson at 0935. They then would go off duty until called in the afternoon to take Train 3 from Edson to Jasper departing at 1740 and arriving at Jasper at 2030.

Even though passenger assignments involve an 8 hour layover in Edson and a relatively long day (0615 to 2030) they are considered very desirable and only engineers with substantial

seniority are able to hold them. The main attraction is the regularity of the hours. This speaks eloquently about the conditions of those who are unable to receive such an assignment.

b) Recommendations – Work Scheduling

The Commission has concluded that the erratic hours of work and unpredictable times of call to work and duration of work assignments are the product of three main features of the work assignment system. These features are:

1. The fact that the determination of which employees will be called to work is made only two hours in advance of the time they are expected to report to duty.

2. The fact that the assignment is made from the top of the pool list regardless of the time of day when the name rises to the top of the list.

3. The fact that there is no coordination of eastward and westward train movements. No attempt is made to so synchronize arrivals of trains proceeding in opposite directions at the away-from-home terminal to permit a crew to return home with a minimum layover.

The Commission believes it to be fundamental to the elimination of chronic fatigue and to the establishment and maintenance of acceptable vigilance standards that these features of the work assignment system be eliminated.

The Commission accordingly recommends that the railways be required to alter the system of freight crew work assignments as necessary to:

1. Permit crew members to be advised at least seven days in advance of the approximate times at which they will be required to work.

2. Assign crews in such a way that their work is performed at roughly the same time of day each day they are on duty.

3. Coordinate the operations of trains moving in opposite directions on the same routes, so that layovers in the away-from-home terminals do not exceed approximately three hours.

Evidence presented to the Commission convinced it that these recommendations are reasonable. The Commission heard from a senior official of British Rail, Mr. Roger Williams, who advised that in Britain, running crew members are assigned to regular trips with certain hours and that they are informed of their assignments as long as a year in advance. The system of crew assignment used in Britain has been developed since the war. Prior to that, the procedures used were quite similar to those presently used by CN.

Mr. Williams advised that the reforms came about partly as a result of pressure from the Unions. He said:

> It was partly that, [and] partly the decision that we made that we would move into a more disciplined situation of actually scheduling trains and having times for trains and being specific on actual times that trains run, and the times that they took to get to a destination. Once you get that situation, that you are very clear on the trains that you are running and the times that you are going to run, the expertise of balancing train crews and giving them a productive out and home balance just fell itself into place.
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> *Transcript of Proceedings*, June 18, 1986, Volume 52, p. 7800 – Roger M. Williams

The Commission was also advised that the organization of the Australian railway system is such that crew assignments are planned much further ahead than they are in the Canadian system. A crew assignment roster is established so that crews know some time in advance, for example, a week, when they will be expected to be available for duty and when they will have days off-duty.

Implementing these recommendations will necessitate the development of a greater degree of sophistication in CN's freight train movement planning. The materials presented to the Commission demonstrated that CN already has a high level of sophistication in planning freight movements. Computers are heavily relied upon in moving freight across the country with sufficient efficiency to meet the demands of CN's customers at competitive prices.

Implementation of these recommendations may require CN to take that planning one step further by assigning individual crews to already planned train runs at the time those runs are planned. The present system of assignment might be appropriate if train movements were organized on a completely ad hoc basis. But that is not the case. It seems that the only aspect of train movement which is not planned well in advance is the assignment of the various running crews whose services will be required in order to move the train.

Some ingenuity and creativity will be required in order to implement these goals. Also it will be necessary to re-evaluate existing institutions such as the pool and pay systems previously described. It may be necessary to substantially modify or perhaps completely abandon these systems.

For example, the second part of the recommendation might be accomplished by dividing the Jasper-Edson freight pool into two parts – the "a.m. pool" and the "p.m. pool". Crew members in the "a.m." half of the pool could only receive assignments that come up in the first 12 hours of the day. Similarly, members of the "p.m. pool" could only receive assignments in the second 12 hours of the day.

It is possible that the differences in the levels of traffic moving in opposing directions along the system might create difficulties in meeting the third part of the recommendation. However, the existence of that unevenness in traffic level is something that CN is surely capable of predicting. The coordination of unequal traffic through sophisticated and probably computer assisted planning is no doubt possible. It should not result in any greater incidence of deadheading than is presently required. However, the deadheading would be anticipated well in advance and would not be preceded by any layover in the away-from-home terminal – at least no layover necessitated by uncertainty as to whether there would be a train movement requiring the crews' services.

The recommendation concerning a maximum of 3 hours for away-from-home terminal layovers must be read in the context of the other recommended improvements to the hours of work regime and the system of crew assignment. It is not intended that a crew would be sent out from Edson even though they required rest. It is contemplated that the various recommended improvements will have the result that if there was sufficient time to return to the home terminal before commencement of the mandatory off-duty period, it is very unlikely that the crew would require rest at the away-from-home terminal. It should however continue to be possible for crew members to book rest in the away-from-home terminal if they require it.

There is no doubt that CN has the resources to permit it to implement this recommendation. The Commission was continually impressed by the competence and sophistication of the CN staff

experts who presented evidence to it. There simply cannot be any doubt that the expertise required is readily available to CN.

However, it is equally clear that there is no will to implement such changes. The greatest difficulty will be achieving a fundamental change in the philosophy of CN's management, to which Labour is an enthusiastic accomplice.

The submissions made by CN to the Commission indicate that it sees the types of changes to the work assignment system which the Commission has recommended to be inimical to the efficient movement of freight.

For example, on the subject of lengthy layovers in Edson, CN said in its written submission to the Commission, that it appreciated and understood the crews' preference for an early return to Jasper. But it observed:

> However the layovers of crews cannot be dictated by their desires alone. Freight train service is very sensitive to customer needs; in fact most freight service is designed from origin to destination on the need of the shippers to meet the demands of their customers, and that design or plan of departures and arrivals, as well as routing, is our commitment to them. It is imperative to meet those commitments if their business is to be retained. And for that reason alone, train scheduling must not be influenced by crew layover time.

In the context of providing more accurate information to crews as to planned train movements CN submitted:

> It is easy, but not productive, to forget that trains are operated for the benefit of customers, and that our internal processes must be adapted in full recognition of that fact.

The Commission is of the view that the adoption of the regime described above would not compromise CN's ability to perform up to the standard required by its customers.

The submissions acknowledge that a high degree of planning is required to design train movements to meet customer demands. The recommendations simply contemplate that crew assignments be introduced as an element of that planning.

The history of CN's response to externally imposed requirements for change suggests that though it has the expertise required to implement the changes contemplated by the Commission's recommendation, it cannot always be relied upon to do so without external coercion. The evidence presented by CP did not impress the Commission that there is any greater likelihood that uncoerced improvement will occur in that railway's systems. Neither is it possible to rely on the unions to promote or facilitate these changes because they have apprehensions that doing so will affect the earnings of their members. Public interest demands that each of these parties be required to make appropriate alterations.

7. Working Conditions

a) Crew Complaints

Working conditions affect alertness and attention to duty. Poor working conditions in any industry inhibit improvements in productivity, jeopardize alertness, and in so doing compromise safety. Accordingly, the concerns expressed to the Commission by running crews about working

conditions on locomotives are relevant and bear directly on the Commission's findings and recommendations with respect to hours of work and rest, work scheduling, and the associated rules. Clearly, working conditions and their effects should be a concern to management, employees and their unions. Furthermore, when working conditions compromise the safe operation of the railroads, the issue becomes one of public concern as well.

Running crews complained before the Commission about specific working conditions within the cabs of locomotives and the tendency by management in recent years to marshall longer and heavier trains. The running crews claimed that sometimes they are called upon to operate trains with less motive power than they desire.

Common running crew complaints about cab conditions included excessive noise and heat, the design and placement of such items as the deadman's pedal, the reset safety control (RSC), seats, radio speakers, and the general cleanliness of the cab and toilet facilities.

In 1984, a report entitled "Canadian Transport Commission Review of Safety and Health Conditions Affecting Employees in the Operating Cabs of Diesel Units in British Columbia" revealed that although cab conditions had improved there was still room for improvement in the context of amenities taken for granted by a large segment of the Canadian working population. The review found that cab conditions and the amenities provided, or the lack thereof, contravened local safety and health regulations. Such simple matters as hand cleansing facilities were virtually absent. The report detailed items which were required by regulation however compliance was incomplete or inadequate.

Ergonomic evidence provided by Dr. Smiley revealed that the noise levels in cabs make it difficult to perform vigilance tasks. In addition, she pointed out that "raised temperature also reduces alertness and performance under monotonous conditions". The effects of excessive noise and heat are aggravated by inadequate ventilation, a problem disclosed in the CTC review.

It is relevant to observe that the nature of the duties these train crew members perform often induces drowsiness. The duties of the front-end trainman are particularly of such a nature. When the train is running his function is to watch the track ahead and the train behind on both sides and to call signals (that is, to orally identify the signal display) across the cab to the engineer.

When a long heavy train is going up a lengthy grade, such as that leading to the Obed Summit, the activity required of the locomotive engineer is very limited. The train is put in full throttle (position 8) at the commencement of the climb and remains there. The train climbs and attains a speed of something in the area of 20 miles per hour. Assuming permissive signals are received there is no activity required of the engineer for a period of as much as 100 minutes other than to observe the signals, communicate with the conductor and the front-end trainman regarding the signals, and watch the track ahead. The cab is noisy and hot, and the environment is not conducive to conversation with the other occupant of the cab.

Several running crew members who appeared before the Commission acknowledged that it is regularly necessary for them to fight drowsiness and they have developed personal methods of doing so. These include walking around the cab, eating sunflower seeds, and attempting to engage in conversation with the other crew members to the extent it is possible given the noisy conditions. Sleeping can and does happen on the job.

In response to the running crew complaints about the increasing length of trains, CN management and specifically Mr. D. Fletcher, Vice-President of Operations, admitted that CN Rail has been marshalling longer and heavier trains and he pointed out that this is a phenomenon common to the North American rail industry. In a survey of railroads comparable in size to

themselves, CN Rail found that they were in the middle of the range in terms of train length. Mr. Fletcher pointed out that CP Rail regularly runs trains of 7,000 feet and longer.

The position of CN Rail on longer and heavier trains was that it was an economic necessity in order to maximize the efficient use of locomotive and rolling stock capacity. It was particularly essential that longer and heavier trains be used in order to remain competitive in a changing economic environment . Specific reference was made to regulatory reform that will be coming in Canada and has already occurred in the United States. Mr. Fletcher expressed the concern that American railways could conceivably capture 30% to 40% of Canadian transcontinental rail traffic if Canadian railways do not become more efficient and contain their costs. Simply, shippers will choose the railway, Canadian or American, that offers not only convenience in shipping but low rates.

In Mr. Fletcher's opinion, the locomotive power marshalled to freight trains was consistent with economic realities as well as the power requirements of the particular trains.

The Commission is of the view that longer and heavier trains are an economic reality as demonstrated by the trend within the entire North American rail industry toward longer and heavier trains. However, it would appear that given the significant implications on vigilance of moving these long, heavy trains over the grades encountered in such areas as the Edson subdivision, that CN management would be motivated not just for employee morale but as a measure of safety, to improve conditions in the cabs of locomotives. The Commission is of the view that the description of certain locomotives as being "comfort cabs" is something of a misnomer particularly given the findings of the CTC study.

The objective of running longer and heavier trains is to reduce the unit cost of transportation by capturing economies of scale. Equally valid should be the objective of providing working conditions in the cabs of locomotives appropriate to the tasks required of the crews.

The running crews are represented by strong unions and over the years they have through the collective bargaining process fought for lucrative compensation packages. The Commission wonders how much emphasis the unions have placed on working conditions when negotiating collective agreements? It appears that to the unions, money has been more important than the working conditions in which their members toil.

Other industries seem to place more importance on modern industrial standards and safe work places. In fact, Federal and Provincial Governments have enacted legislation to ensure safety in the work place. Clearly, in the view of the Commission the railways of Canada are obligated to ensure that their workers can perform the tasks expected of them in a work place conducive to safety. Inadequate ventilation would not be tolerated in a railway office complex nor should it be tolerated within the cab of a railway locomotive. VIA Rail recently placed an order for 30 locomotives at a cost of $2,000,000. each. The Commission found it shocking that those locomotives are of a design and standard that does not incorporate any improvements of the nature recommended in the 1984 CTC review. VIA Rail admitted that there was no ergonomic input into the design specifications.

Further, the Commission concludes that present cabs are far from adequate with respect to noise levels, temperature and ventilation control, vibration and seating. Dr. Smiley testified that these factors have a definite effect on the ability of train crews to remain alert. The Commission believes that insufficient attention has been paid to ergonomic factors in the design of cabs currently in use. For example, noise levels are obviously excessive. Running crew members testified that they use earplugs provided by CN, however, management claimed to be unaware that it provided the plugs and maintained that noise levels were not excessive.

The 1984 CTC review led to a series of recommendations to improve working conditions in locomotive cabs. The recommendations with respect to providing clean and sanitary toilet facilities, a source of drinking water, receptacles for trash, and hand cleansing facilities are logical and would provide facilities, which are common in other work environments.

The Commission is of the view that the RTC should ensure prompt railway compliance with the above noted recommendations contained in the 1984 report.

b) Recommendations

The Commission recommends that Canadian railways immediately institute improvements in conditions on existing locomotives by implementing the recommendations of the 1984 report relating to noise, temperature, ventilation control, vibration, seating, toilet facilities and hand washing facilities. The RTC should review the progress of the railways to date and ensure that they comply fully with the RTC orders.

The Commission also recommends that the railways implement design changes for future locomotive cabs incorporating ergonomic principles. Noise reductions, ventilation improvements, adequate communication facilities and temperature control are not beyond the realm of the possible on Canadian locomotives.

F. Engineer Hudson's Medical Condition

1. Medical History

The medical condition of the crew members was a subject of obvious interest to the Commission. The CN medical records revealed that the medical conditions of all crew members other than Engineer Hudson were unremarkable and were not of significance. However, Hudson's health had been a matter of concern for several years prior to the accident and in particular since December 1984. The Commission accordingly, gave careful consideration to Hudson's medical history.

a) High Blood Pressure

Engineer Hudson received the regular medical examinations required under CN's internal policy from the commencement of his service in 1970. Those examinations were unremarkable prior to the examination performed in April 1976 when an elevated blood pressure was noted. Hudson was assessed fit for duty at that time but CN's Regional Medical Officer, Dr. G.C. Pretty, obtained follow-up reports in October 1976 and May 1977 on the blood pressure situation. It continued to be high throughout that period.

The April 1978 assessment was unremarkable but a July 1980 medical review again revealed elevated blood pressure and again prompted a request for a follow-up report in January 1981. That report was not received. In what was acknowledged by Dr. Pretty to have been a mistake in his office, no further action was taken to monitor Hudson's condition at that time.

b) Alcohol Problem

Hudson's medical examination in September 1982 again revealed elevated blood pressure and the examiner noted, "'tied one on over weekend' employee states equivalent 40 oz. liquor in ten hours".

Other events occurring at approximately the same time and which lead to disciplinary measures against Hudson, indicated to his superiors that he was experiencing difficulty coping appropriately with the stresses of his job. There was belief on the part of management that he had a problem with alcohol and he was referred to Mr. Colquhoun of CN's Employee Assistance Program, a program intended to assist employees who have personal problems including alcoholism.

Admission to Henwood Rehabilitation Centre, an institute operated by the Alberta Alcohol and Drug Abuse Commission, was recommended and an application for admission prepared, but Hudson refused admission to that facility and indicated he would handle his problem himself. There was clearly a problem – management so understood and Hudson so admitted.

The high blood pressure readings revealed in both the September, 1982 medical and the medical done by Dr. Pretty himself in November, 1982 did not prompt a six month follow-up as had occurred after the 1976 periodic medical. No explanation for this omission was proferred.

Even more significant is the fact that there was no medical follow-up after November 1982 to determine whether Hudson continued to have alcohol problems. In 1983 there were 2 incidents which resulted in Hudson's being assessed disciplinary demerits. In the fall of 1983 he was interviewed with regard to his work record which indicated he had been unavailable for work on a total of 41 days in a period of 3½ months. These incidents and the events of 1985 establish

clearly that in 1983 Hudson was not successfully handling the alcohol problem himself. There was no explanation for the failure to require medical attention at that time.

In February 1984 he was interviewed by Mr. W.J. Deer, the Assistant Superintendent. In his letter to Hudson summarizing the interview, Mr. Deer said:

> I advised you at this interview that I had reason to believe you may have an alcoholic problem and you assured me that this was not the case. We discussed the Company Employee Assistance Program and you were made aware of how this program worked. You have assured me that if in future a problem of this nature did arise, you would contact a local supervisor or if you preferred, you could call me direct in Edmonton.

The evidence demonstrates that there was an inadequate effort by both supervisory staff and medical officers to determine whether Hudson was succeeding in his efforts to cope with his alcohol problem. The alcohol problem belonged both to Hudson and, while he was its employee, to CN. It seems that all the responsibility for dealing with it was placed on Hudson – probably the person least capable of discharging such a responsibility and the person least likely to do so.

In the late autumn of 1984 Mr. Albert Wagner, the Assistant Superintendent in Jasper was told in confidence by a friend of Hudson's that the alcohol problem was still manifest. Mr. Wagner held Hudson out of service because of this situation and made completion of the Henwood Rehabilitation Program a condition of his continued employment with CN.

The process of applying to enter Henwood involved coming to Edmonton in December 1984 to receive a medical examination (for which he was overdue in any event) and to meet with Mr. Colquhoun of the Employee Assistance Program. Hudson was treated at Henwood in late January and early February 1985. Upon completion of that program Mr. Colquhoun and Hudson's Henwood counsellor recommended that he participate in a self-help group program thereafter, but Hudson did not take up this recommendation.

CN did nothing to ensure that Hudson did anything after Henwood to continue his rehabilitation.

Hudson returned to service on February 10, 1985. During the remainder of February and until early April he worked the Jasper-Edson run and the Jasper-Blue River run but his time records include several 4 or 5 day periods when he booked off "sick".

During this period Mr. Colquhoun was concerned that Hudson's work availability records suggested that he was not handling his alcoholism successfully. He says that he had nothing, however, with which to confront Hudson other than suspicion and, accordingly, did nothing.

There does not appear to have been any discussion between Mr. Colquhoun and Hudson's supervisors regarding these suspicions and concerns. That is probably because under the terms of the Employee Assistance Program Mr. Colquhoun had a duty of confidentiality. In any event, Mr. Wagner's evidence was that when Hudson booked "sick" with frequency after his return from Henwood, nobody investigated the cause.

From April 8, 1985 until the end of June, Hudson took an assignment in the Jasper yard. There he had regular hours and regular days off. During that period he did not book off work. This improvement in his record permitted Mr. Colquhoun to conclude that Hudson had his problem under control.

This conclusion must be considered questionable. Hudson suffered from a type of alcoholism that is characterized by intermittent bouts of excessive drinking as distinct from the type of

alcoholism characterized by more or less continuous alcohol abuse. The evidence of no abuse of alcohol for several weeks was not, in Hudson's case, evidence that all was well. Certainly a systematic program of monitoring his condition when on the job was called for; no such program was provided.

Just as certainly, some form of support for, and encouragement of, further rehabilitative efforts by Hudson was called for but was not forthcoming. The evidence suggests that in the first six months of 1985 CN's attitude toward Hudson's alcoholism was at best one of limited passive monitoring – not one of active promotion of recovery.

Of course, Hudson might well have rejected any further offers of assistance – the assistance he received, the Henwood Rehabilitative Program, had been more or less forced upon him. But the refusal of an offer of assistance could in itself have served to focus management's attention on the importance of continued careful monitoring and frequent reassessment of Hudson's situation both on and off the job.

Monitoring of Hudson's condition by medical officers of CN during this period was also deficient. In his testimony Dr. Pretty stated that Hudson was being monitored by Dr. Wilkinson in Jasper as to "his borderline blood pressure". According to Dr. Pretty, Dr. Wilkinson would have been doing this in his capacity as Hudson's family doctor and as CN's Jasper District Medical Officer. Dr. Pretty testified that he assumed that if Hudson's alcoholism was presenting any problem, Dr. Wilkinson would have been aware of it and would have been in touch with Dr. Pretty. One wonders how Dr. Pretty could have possibly made such an assumption. Dr. Wilkinson had no contact with Hudson whatsoever prior to July 1985. If there was any concern (and there patently ought to have been) about Hudson's blood pressure following his medical examination in December 1984 or his treatment in Henwood, it was not communicated by Dr. Pretty to Dr. Wilkinson. Dr. Wilkinson did not even know that Hudson had been in Henwood or that he had an alcohol problem until the events of July 1985.

Dr. Pretty's evidence clearly established that he was of the view that monitoring of Hudson's medical condition during early 1985 was called for. The evidence also established that there was no such monitoring and no reasonable basis to support Dr. Pretty's impression that there was. These omissions relating to a person known to be regularly in control of a train must be branded irresponsible and appalling.

c) Pancreatitis and Diabetes

The events of July 1985 establish that in fact the alcohol problem was not under control. Hudson took his annual vacation leave commencing on June 29. On July 8 he was admitted to Seton General Hospital in Jasper. He was vomiting blood, experiencing abdominal pain and displaying slight jaundice. The physician who treated him, Dr. Wilkinson, was told by Hudson's family at that time that Hudson had been using alcohol excessively over the preceding 3 years and particularly over the preceding 6 months.

On July 9 Dr. Wilkinson transferred Hudson to the Royal Alexandra Hospital in Edmonton where he come under the care of Dr. Brian W. Johnson. Diagnosis of Hudson's disease was a matter of some difficulty but after exploratory surgery it was determined that he was suffering from acute pancreatitis of moderate degree.

The medical evidence indicated to Dr. Johnson that the condition had existed for some time and that the acute episode that Hudson was experiencing was probably precipitated by a relatively recent ingestion of large quantities of alcohol.

During the surgery it was discovered that the blood supply to the large bowel had been interrupted as a consequence of the pancreatitis. The large bowel was completely removed necessitating an ileostomy.

Treatment continued at the Royal Alexandra Hospital until July 31 and thereafter at the Seton Hospital in Jasper until August 19. Prior to the discharge from the Royal Alexandra Dr. Johnson bluntly advised Hudson that his condition was the result of his drinking and warned that if his use of alcohol continued it would likely cause his death.

At the time of Hudson's hospitalization in July his blood sugar level was markedly high. Over the course of his hospital stay that condition was normalized through control of diet. It was recognized that he had a diabetic condition but one that did not require any treatment other than dietary control.

d) Return to Work – October 1985

After release from hospital, Hudson attended on Dr. Wilkinson several times throughout September and on September 26 indicated a desire to return to work. Dr. Wilkinson contacted Dr. Pretty in Edmonton on September 27 to discuss Hudson's condition because Hudson was under the impression that Dr. Pretty would have to assess that condition prior to his being allowed to return to work.

This was the first time that Dr. Pretty and Dr. Wilkinson had ever consulted on the subject of Hudson. Dr. Pretty was aware of Hudson's hospitalization in July having been advised of it by Mr. Colquhoun. Neither his records nor his evidence indicated that he had given any specific attention to the situation prior to receiving Dr. Wilkinson's call, nor apparently did he appreciate it was alcohol related. This is difficult to understand given that pancreatitis is often related to alcohol abuse and Dr. Pretty knew of Hudson's alcohol problem.

It was decided that no assessment by Dr. Pretty of Hudson's fitness for work was required but that Dr. Wilkinson's assessment would be sufficient. On October 29, 1985 Dr. Wilkinson and Dr. Pretty again consulted by telephone. Dr. Pretty's note of the conversation says, "Dr. Wilkinson phoned, man admitted to hospital – pancreatitis and acute bowel. No evidence of alcoholism at time of admission. Fit to resume duty. Liver tests normal. No alcohol consumption for past several months." The comment that there had been no alcohol consumption for the past several months is accurate only if it refers to the time since hospitalization in July of 1985. Hudson's family had advised Dr. Wilkinson of his alcoholism and Dr. Wilkinson had advised Dr. Johnson of this situation when Hudson was transferred to the Royal Alexandra Hospital in Edmonton.

Dr. Wilkinson's assessment that Hudson was fit to resume duty was made after taking into account the three aspects of Hudson's medical condition that were relevant: his alcoholism, his diabetes and his ostomy, all of which appeared under control. No limitation on the type of work Hudson should undertake was suggested nor was any regular and ongoing form of monitoring imposed, nor apparently even considered by either CN's medical or operations officers.

Engineer Hudson in fact returned to work on October 28th and on his own initiative took an assignment as the Hinton switcher, a job with regular hours and a regular day off, Sunday. He continued in that work until Christmas without any significant interruption.

It would seem reasonable to expect that given the fact of Hudson's hospitalization and surgery in July and the nature of his medical condition on return to work in October, there would have been consultation between Dr. Pretty and Hudson's Jasper supervisors as to the need for

continued monitoring of his work and the nature of the duties to which it would be most appropriate to assign him. There was no such consultation.

The monitoring of Hudson's performance and condition which did occur after his return to work was remarkably casual. Even the "passive monitoring" of which there was some evidence in the first 6 months of 1985 did not continue in the 3½ months preceding February 8. CN's failure to monitor Hudson's condition is all the more startling given that CN management and medical officers both admit being aware that alcoholics are inclined to conceal their condition and disguise their dependency.

It would also seem reasonable to expect that Dr. Pretty would have consulted with Dr. Wilkinson to ensure that a program of continued assessment of Hudson's condition was in place. No such consultation occurred. Dr. Pretty did assign a "Code 05" to Hudson's file which meant that his condition was recognized and identified as alcoholism. This apparently was of significance to the computerization of the records and did not imply any particular course of follow-up. Dr. Pretty also diarized his file for further review on February 1, 1986 although it is not apparent what form the follow-up intended for that date would take.

Hudson attended on Dr. Wilkinson on January 24, 1986 to discuss having the ileostomy closed. Dr. Wilkinson considered his condition to be satisfactory. Hudson advised him that he had discontinued the use of alcohol and a test performed by Dr. Wilkinson did not contradict this. Blood samples taken that day showed that Hudson's blood sugar was abnormally high but this was not considered significant in the overall assessment that his condition was satisfactory. No record of Hudson's blood pressure was made though Dr. Wilkinson says he would have taken it.

Dr. Wilkinson proposed Hudson's re-admission to the Royal Alexandra for closure of the ileostomy and advised Dr. Pretty by telephone that everything appeared satisfactory.

In fact, Hudson had not discontinued his use of alcohol. His wife advised the Commission that he had been drinking intermittently between December 25th and January 1st and quite heavily from then to January 5th, 1986, when, having received a lecture from his son, he stopped. If this particular bout of drinking had any significant consequences for Hudson's health, they were not apparent on January 24th when he attended on Dr. Wilkinson.

2. Medical Examiner's Evidence

Only a very small portion of Hudson's body was recovered from the collision debris. Dr. Derrick J. Pounder, the Deputy Chief Medical Examiner for Alberta conducted an autopsy on the remains that were recovered.

The recovered remains were sufficient to permit Dr. Pounder to conclude with certainty that there was no alcohol or drug in Hudson's system at the time of his death.

The remains were not adequate to disclose any evidence of a catastrophic event which would have disabled Hudson suddenly prior to the collision, or to permit elimination of such a possibility.

3. Medical Opinions:

a) Diabetes

It was the considered and confident opinion of Doctors Johnson, Pounder and Wilkinson that there was no reasonable possibility Hudson had experienced a sudden diabetic coma at the time

of the collision. Dr. Leo Malowany, whose opinion was based on a review of the medical records and the testimony of doctors who had treated Hudson, was also of the view that although on the basis of the January 1986 blood tests, Hudson's diabetes was not under control it was not likely that a diabetic coma could have overcome Hudson while he was operating Train 413 on February 8.

b) Pancreatitis

The question of whether Hudson could have been incapacitated by an attack of pancreatitis just prior to the collision was also explored. Dr. Johnson advised that an episode of pancreatitis would not have rendered Hudson suddenly incapacitated – it would have come on over a period of hours. Such an episode might be precipitated by the use of alcohol occurring even up to a month before but the likelihood of a bout of drinking which ended on January 8 precipitating an attack of pancreatitis on February 8th is not great.

c) Heart Attack or Stroke

The possibility that Hudson suffered an incapacitating heart attack or stroke just before the collision was addressed by Dr. Malowany. He noted that several of the characteristics associated with an elevated risk of heart attack or stroke were present in Hudson's case. Hudson had a history of high blood pressure, was diabetic and was a heavy smoker. All of these factors permit the conclusion that Hudson was at higher risk of experiencing a heart attack or stroke than the general population.

Dr. Johnson, though he agreed that Hudson was at increased cardiac risk, was of the view that at age 48 Hudson was too young to have been a likely candidate for a stroke. Dr. Pretty and Dr. Wilkinson were of the view that Hudson's condition did not raise any particular concern in this area.

4. Conclusions Regarding Medical Condition

The information gathered by the Commission with respect to Hudson's medical condition reveals that he had a history of alcoholism, pancreatitis, diabetes and high blood pressure. About 6 months prior to the collision he had an acute attack of pancreatitis of moderate degree. The condition necessitated a colostomy and Hudson was hospitalized for a period of 5 weeks. Hudson had a bout of heavy drinking about one month before the accident but was not under the influence of alcohol at the time of the collision.

Hudson's diabetes was not under control in late January. Probably it was not at the time of the collision. However, his diabetic condition was such that no real possibility exists that it caused a sudden incapacity prior to the collision. The medical evidence also justifies the elimination of the possibility of a suddenly disabling attack of pancreatitis.

Each of three characteristics of Hudson's health placed him at a higher risk of heart attack or stroke than the general population. The medical evidence presented to the Commission was divided as to whether or not his condition was such that a suddenly disabling cardiac attack or stroke could have occurred prior to the collision. There is no evidence upon which this possibility can be confidently eliminated.

Hudson had received medical examination regularly throughout his service with CN. The CN medical officer was aware of the particulars of his medical condition. However, there was

practically no monitoring of Hudson's medical condition by CN officers or any continuing program designed to promote his recovery from alcoholism. Neither was there any liaison between the medical officer and Hudson's supervisors with a view to ensuring that he received appropriate assignments and supervision.

Notwithstanding Dr. Wilkinson's assessment that Hudson was fit to return to work in October, Dr. Wilkinson had not received any advice from CN as to the nature of Hudson's duties as an engineer. The serious nature of the attack and surgery undergone by Hudson in July and the condition which precipitated those events suggest that it would have been appropriate for Hudson's condition to have been assessed by Dr. Pretty, who presumably does have an intimate familiarity with an engineer's job. The situation demanded a more rigorous medical monitoring of Hudson's condition by Dr. Pretty or his office after Hudson's return to work.

The serious nature of Hudson's medical condition in 1985 raises a strong possibility that it was a factor contributing to the collision of February 8. Detailed analysis of the evidence regarding that condition does not permit either confirmation or elimination of the possibility that Hudson's medical condition was a contributing factor.

The Commission therefore concludes that Hudson's medical condition possibly contributed to his failure to control Train 413. The Commission also concludes that there are serious deficiencies in the manner in which CN monitored and reacted to that condition. The Commission finds that both the policies and procedures that permitted a man in Hudson's medical state to be responsible for the operation of a freight train on the CN main line to be unacceptable.

5. Medical Supervision

a) Deficiencies

Analysis of Hudson's medical history revealed deficiencies in the system by which the medical condition of running crew employees is monitored, assessed and maintained by CN's medical officers. CN's policy of regular medical examinations exceeds the current legal requirements. The existing regulations only deal with periodic testing of the vision and hearing of railway employees. However, CN's system permitted a man of doubtful medical status to be at the controls of Train 413. Somehow, the system failed.

Some of the deficiencies in the system were obvious. Medical abnormalities and concerns revealed by regular physical examinations were not properly followed up. A system of record keeping intended to call for medical follow-ups as required, apparently does exist, but on more than one occasion in Hudson's case, it failed to result in his high blood pressure condition being monitored. An efficient and reliable system of diarization is obviously fundamental to an effective system of medical supervision.

The Commission was also concerned as to the nature of that follow-up which did occur. It appears that this monitoring was intended only to determine whether the undesirable condition revealed by the regular examination continued to exist. There was no attempt by CN medical officers to require Hudson to take steps to eliminate the medical concern. No program which might have resulted in the reduction of his blood pressure to an acceptable level was implemented. The medical follow-up of Hudson's alcoholism was also remarkably casual.

The Commission was also concerned that the methods and criteria used in the assessment of fitness for work are inadequate. The evidence presented to the Commission does not permit it

to be specific as to these deficiencies but the seriousness of Hudson's medical condition, coupled with the events of the collision itself, are sufficient to raise the concern. The evidence regarding the determination that Hudson was fit to return to work in October after his serious operation in July 1985 heightens that concern.

Even Hudson had been under the impression that he would have to be examined by Dr. Pretty before he could return to work. Dr. Wilkinson didn't know what the requirement was but when it was determined that the assessment could be made by him, he made it. This, notwithstanding he had never received any direction from CN as to the duties, dangers and stresses of an engineer's job or of Hudson's particular sensitivity to stress.

The evidence also indicates that Dr. Pretty did not have an accurate understanding of Hudson's condition when Dr. Wilkinson and he discussed it prior to the assessment being concluded. Dr. Pretty seems to have understood that there was no alcohol involved in the precipitation of Hudson's pancreatic attack. That was simply inaccurate. A system by which such a fundamental failure of understanding can arise is unacceptable.

b) Recommendation – Audit of Medical Office

These observations lead the Commission to recommend that CN be required to audit the procedures and policies of its medical office regarding the assessment, monitoring and maintenance of running crew employees with a view to identifying specific deficiencies and developing policies and procedures which are effective to ensure that a man in such seriously frail medical condition as Hudson can never again be placed in charge of a train.

c) Recommendation – Local Doctors

The Commission is able to be specific about one deficiency that exists in the system. Dr. Wilkinson was CN's local medical officer in Jasper. He was a private physician practicing in Jasper and his appointment as CN's medical officer put him in a position of potential conflict of duties. To reveal to CN health problems identified might constitute a breach of his duty of confidentiality to his patient and he might therefore be reluctant to report.

CN has suggested that there be legislation requiring a doctor to disclose to CN information relevant to the fitness of a running crew employee, notwithstanding doctor-patient confidentiality.

The Aeronautics Act has been recently amended to include a provision which deals with this problem in the aeronautics industry. That section reads:

5.5 Medical and Optometric Information

(1) Where a physician or an optometrist believes on reasonable grounds that a patient is a flight crew member, an air traffic controller or other holder of a Canadian aviation document that imposes standards of medical or optometric fitness, the physician or optometrist shall, if in his opinion, the patient has a medical or optometric condition that is likely to constitute a hazard to aviation safety, inform a medical advisor designated by the Minister forthwith of his opinion and reasons therefore.

(2) The holder of a Canadian aviation document that imposes standards of medical or optometric fitness, shall, prior to any medical or optometric examination of his person by a physician or optometrist, advise the physician or optometrist that he is the holder of such a document.

(3) The Minister may make such use of any information provided pursuant to section (1) as he considers necessary in the interests of aviation safety.

(4) No legal, disciplinary or other proceedings lie against a physician or optometrist for anything done by him in good faith in compliance with this section.

(5) Notwithstanding section (3), information provided pursuant to section (1) is privileged and no person shall be required to disclose it or give evidence relating to it in any legal, disciplinary or other proceedings and the information so provided shall not be used in any such proceedings.

(6) The holder of a Canadian aviation document that imposes standards of medical or optometric fitness shall be deemed, for the purposes of this section, to have consented to the giving of information to a medical advisor designated by the Minister under subsection (1) in the circumstances referred to in that section.

Aeronautics Act, R.S.C., c.A-3 as amended by S.C. 1985, c.28

The Commission recommends that a similar legislative provision be adopted for the railway industry. In doing so it recognizes that there are structural differences between the railway industry and the aeronautics industry which will necessiate modification of the provision. For example, qualification of running crew members is not administered by the government. It is administered by the railways and accordingly there is no equivalent of a "Canadian Aviation Document" in the railway industry. Secondly, the railways themselves are presently the agency which monitors the physicial condition of the running crew employees. It may be thought that some modification of the Aeronautics Act provision would be required since the logical party to whom a physician or optometrist ought to report is the employer. This might necessiate greater protection for the employee against the misuse of the information than is contained in the Aeronautics Act provision.

d) Recommendation – Management Liaison

The Commission is also of the view that there must be an effort made to develop a close liaison between CN's medical officers and CN's local operations officers. Operations officers must be made aware of any medical concern that could conceivably affect the ability of a running crew employee to perform his duties. They must also be vigilant in bringing to the attention of the medical officers any abnormalities they observe.

Medical officers must be made aware of the duties which are required of running crew employees. There must be coordination of the efforts of these two departments of management when they are responsible for the supervision of a running crew employee who suffers from a medical condition which when not under control makes him potentially dangerous to himself, his co-workers and the public.

The Commission recommends that CN take steps to establish effective coordination of the functions of its medical officers and operational officers.

e) Recommendation – CTC Regulations

It is recommended that the CTC review its regulations concerning medical fitness with a view to including standards with respect to matters of physical health in addition to vision and hearing acuity and that regulations establishing such standards be promulgated as soon as possible.

6. Rehabilitation of an Employee with an Alcohol Problem

a) CN's Employee Assistance Program

The Commission also heard evidence regarding the Employee Assistance Program which is in place at CN. This program provides assistance to employees who are suffering from a number of stressful situations. Chief among these is alcoholism.

When it is suspected that an employee has an alcohol problem, management, a fellow employee, a family member or a union official may refer the employee to the Employee Assistance Program. The program operates with complete confidentiality. Nothing which is learned from or about the employee by the personnel in charge of the program is conveyed to management.

CN promotes awareness of the program among its employees in the hope that they will seek help before their problem puts the safe operation of the railway in jeopardy. An effort is made to ensure that employees are aware that by seeking help they do not jeopardize their employment.

CN's Employee Assistance Program is not intended in any way as a substitute for its disciplinary program or as means of relieving management of any of its supervisory obligations.

It is a breach of Rule G of the UCOR for an employee to be under the influence of alcohol or to use alcohol while on railway property. The usual consequence of a breach of that Rule is immediate termination of employment. The Employee Assistance Program is not intended to relieve any employee of the consequence of breaching that Rule. Neither does it relieve operations officers from their duty to ensure that an employee is fit for duty when he reports to work.

When Assistant Superintendent Wagner in late 1984 required Hudson to obtain treatment for alcoholism as a condition of continued employment, that treatment was arranged by CN's Employee Assistance Program. The officer in charge of the program, Mr. Colquhoun, arranged for Hudson's admission into the Henwood treatment centre and followed Hudson's progress through that course of treatment.

However, on Hudson's return to work his condition and progress thereafter was not given any significant attention. Mr. Calquhoun says he was suspicious that Hudson's alcoholism was still a problem but had no evidence sufficient to justify confronting him directly. Operations officers monitored his conduct at work in a very casual manner. Hudson received no medical follow-up whatsoever. Clearly during this period his alcoholism continued to be a major problem. The events of July 1985 render that beyond doubt.

The Commission concludes that Hudson's participation in the Employee Assistance Program was tacitly considered by management to effect a complete delegation of responsibility for monitoring Hudson to the Program. This is not acceptable.

The Commission heard much evidence regarding an alternative employee assistance program in use on some American railways. It is called "Operation Red Block". The fundamental principles of this program are the same as those of CN's Employee Assistance Program. An employee with an alcohol problem is encouraged to seek the assistance of the program before his problem leads to an accident. He can seek help without fear that his admission of a problem will jeopardize continued employment.

One feature of Operation Red Block makes that program unique and controversial. If an employee is impaired by alcohol or drug while on duty his co-workers may report the situation to management without necessarily costing the impaired employee his job. The employee is sent home and no Rule G charge is laid providing the employee seeks the assistance of a program counsellor within a few days. Such by-passing of Rule G is allowed to occur only once in a five year period for any one employee. If the situation recurs within five years the ordinary consequences of breaching Rule G follow.

There is considerable controversy as to whether this feature of the Operation Red Block program is desirable. On one side it is observed that it eliminates any reluctance on the part of co-workers to report impaired employees by ensuring that every employee has at least one chance to redeem himself. On the other side it is noted that the provision contemplates an employee participating in train operations while impaired without any disciplinary consequences. This is seen by some as an unacceptable compromise of safety standards.

For example, the Commission was advised by officers of CP Rail that they reject the approach altogether. The CP officer advised, " . . . we do not embrace the aspect of forgiveness when an individual is found in a safety related job reporting under the influence of alcohol or drugs".

The Commission does not intend to enter this debate since it is clear that none of the employees involved in the Hinton collision was impaired by alcohol or drug at any relevant time.

It is appropriate, however, for the Commission to observe that the witnesses who described the Operation Red Block Program and the program used by Canadian Pacific emphasized the fundamental importance of follow-up monitoring in the successful achievement of the goals of the program.

CP Rail officers impressed the Commission with the description of the follow-up monitoring aspect of their program. CP's Vice President responsible for labour relations advised:

> Where an employee does take treatment he must supply written confirmation of in-house treatment. In fact, our Chief of Medical Services works very closely with division officers ensuring the direction of the individual to acceptable treatment centres. He must supply written confirmation that the treatment, at the end, as been successfully completed. He must establish a monitoring relationship with a doctor in his home community and he must furnish a written commitment to abstinence.
>
> He is required to participate regularly and actively in AA or, in the case of a drug abuse instance, to a similar treatment agency. And he must submit regular reports of abstinence from his doctor on a schedule that is arranged in advance. Normally they run every two weeks for three or four months after the treatment and followed by once a month for the balance of the year and then for every two months until the end of the second year, at which time, if all has gone well and the documentation supports his rehabilitation is in fact complete, the need for individual medicals, testings of that, is not required.
>
> *Transcript of Proceedings*, June 12, 1986, Vol. 48, p. 7054 – Robert Colosimo

Consideration of the various programs which were described to it has led the Commission to conclude that the essential goals of any such program must include:

- To ensure that the employees in need of assistance are brought into the program;
- To ensure that employees in the program receive the highest quality of attention and assistance possible;
- To ensure that employees are monitored and supported as long as necessary to ensure that any success achieved is maintained;
- To ensure that if the program fails, the employee is not returned to work.

In Hudson's case CN's program failed in at least three of these areas. He was brought into the program as long as two years after management knew of his problem. The treatment he received at Henwood was no doubt the best available but was not followed by any continuing treatment. Though the Henwood treatment had been made a condition of continued employment, a form of continuing treatment such as the AA Program, though suggested, was not made a condition of employment and was not undertaken. As has already been observed, there was no effective monitoring after his return to work either inside the Employee Assistance Program or out of it. If any assessment was made that Hudson had achieved a level of rehabilitation sufficient to justify his return to work when he finished the Henwood program, it was not an accurate assessment.

It may be that the deficiencies in the application of CN's Employee Assistance Program in Hudson's case result from the fact that resources available for execution of the Program are spread very thinly. The Program has only two paid officers responsible for 6,000 employees in Alberta. However, it is observed that CP's program has no exclusively assigned staff.

b) Recommendations – Employee Assistance Program

The Commission recommends that the structure of CN's Employee Assistance Program be reviewed and improved to ensure that it adequately provides for a high level of effective monitoring of and continuing support for employees participating in it as long as is necessary and that it is designed to ensure that an employee whose problem persists notwithstanding participation in the Program, is not assigned to duty.

The Commission also recommends that CN take whatever steps may be necessary to ensure that management officers do not consider or treat the Employee Assistance Program as a substitute for normal management function. Knowledge that an employee is participating in the Program must not lead to any relaxation of managerial vigilance or any unintended leniency in the application of disciplinary rules. The Employee Assistance Program's goals of assistance and rehabilitation of the employee must never be allowed to prejudice the safe operation of trains.

G. Hudson's Personal Life

Because of the critical role played by Engineer Hudson, the Commission looked at his background and personal situation. The revelation of some of the information learned in the process was painful to Hudson's family and community. However, notwithstanding the pain they have endured, Mrs. Hudson and her children recognized the basic importance of the information to the task of the Commission and they cooperated throughout the investigation by giving consent for the production of confidential information to the Commission.

The examination revealed several faults in the system in which Hudson worked and has moved the Commission to make several recommendations for the improvement of that system. If these recommendations are progressive and worthwhile a large measure of gratitude will be due to the Hudson family.

Though the Commission did not consider it necessary to subject them to the ordeal of testifying in public, its Counsel did speak to Mrs. Hudson, her daughter Cheryl, and son Shane, and obtained a written statement from them. In addition, the Commission was provided with copies of the statements given by these family members to the R.C.M.P. shortly after the collision.

The R.C.M.P. statements given by the Hudson family indicate that in early January 1986 as a result of Hudson's continued drinking, Mr. and Mrs. Hudson had separated. Hudson went to see Mrs. Hudson every day and just before leaving Edson on the evening of February 7 he phoned her to arrange to see her on his return from Edson on Saturday, February 8.

In the R.C.M.P. statement given by Hudson's daughter Cheryl on February 10, she recalled that on February 7 before going to work he had told her that ". . . he had to make one more trip before he had his miles in, then he would have the rest of the month off". He had many projects on the go that were keeping him busy and he seemed to be looking forward to some free time to give attention to them.

In a conversation with his son Shane, a CN trainman, when they worked together earlier in the week of the collision, Hudson had spoken of going to Smithers, British Columbia after he had his miles in for the month to explore the possibility of transferring there.

Of course the information in Cheryl Hudson's statement regarding Hudson having his miles in with one more trip is not accurate. The meticulous records Hudson kept of his miles were produced to the Commission. These were completely up to date – the last entry being a note of his call to duty at 1800 on Friday, February 7. It is not likely Hudson was mistaken about the number of miles he had accumulated. Perhaps his statement to his daughter can be interpreted as a recognition on his part that after 30 days on call, 26 days of work, and 4800 miles he was ready for some time off.

It is clear that Engineer Hudson's personal life, his health and his family situation probably placed him under considerable stress in addition to the stresses caused by the nature of his work. The possibility exists that these factors contributed to the events of February 8. The nature of that contribution would have been to intensify the effects of other factors such as the state of his health and his working hours.

The existence of these personal stresses when added to the stress created by the nature of his work and considered in light of the reaction to stress that he had demonstrated in the past, gave rise to speculation that his inaction in the cab of Train 413 might have been deliberate.

The Commission however considers that possibility to be remote. Engineer Hudson's family observed him to be in good spirits. He was in daily contact with and planned to meet his wife on

his return to Jasper. His family believes that he had not taken alcohol since mid-January and that he was responding to the emphatic warnings he received from them and from his doctor that he must control his alcoholism. He was also expecting soon to be relieved of the inconveniences created by his colostomy. It does not seem likely to the Commission that he was in such a state of mind as might produce suicidal tendencies. It also seems very unlikely that if he had such tendencies, he would manifest them in a manner which would most certainly cost others their lives.

Accordingly, the Commission views the personal situation of Engineer Hudson to be a factor aggravating the other stresses and conditions which might have contributed to the collision but eliminates from consideration the possibility that Engineer Hudson's failure to take action was deliberate.

H. Regulation of Operations

It will be obvious that every railway requires a set of rules to govern the movement of its trains. The regulation of the operations of a national railway employing thousands of people in the movement of millions of tons of freight over thousands of miles of track must be sophisticated, well understood and respected by all involved, and supported by a system of effective enforcement.

The collision at Dalehurst on February 8 represents a major failure of the system of train movement regulation in use by CN. The Commission accordingly considered it necessary to give this subject considerable attention.

The foundation of the system by which train movements are regulated in Canada is the operating rules. The extent to which operations are orderly and safe depends on the quality of those rules. It also depends on the interpretation and application of the rules by the railway's employees. This in turn depends largely on the manner in which those employees, in particular running crew employees, are supervised and disciplined by management.

Since the personal safety of passengers, of railway employees, and the security of the freight transported, all depend on the effectiveness of this regulatory system, government has a responsibility in the establishment and enforcement of the rules.

It is therefore appropriate to first describe the existing system of rules and then consider the participation of employees, management and government in the operation of the regulatory system.

1. Rules

a) The Uniform Code of Operating Rules

The first source of rules governing railway operations is the Uniform Code of Operating Rules, Revision of 1962 (UCOR). These rules were formulated by the Canadian railways and several American railways. They have been approved and adopted by the Federal Government's railway regulatory agency – currently called the Railway Transport Committee (RTC) of the Canadian Transport Commission (CTC). Accordingly, they have the status of law.

A wide range of subject matters is covered by the UCOR. It constitutes a reasonably comprehensive set of specific instructions governing the conduct of running crew employees in the movement of trains. The declared philosophy of the rules is identified by the general notice appearing at the beginning:

> Safety is of the first importance in the discharge of duty.
>
> Obedience to the rules is essential to safety.
>
> To enter or remain in the service is an assurance of willingness to obey the rules.
>
> The service demands the faithful, intelligent and courteous discharge of duty.
>
> To obtain promotion, ability must be shown for greater responsibility.

UCOR, p.2

Early in the Commission's study of the UCOR, it became apparent that there are many anachronistic provisions. A running crew member whose service is exclusively on a subdivision controlled by Centralized Traffic Control, would never engage in the activities addressed by the vast bulk of the rules. The Commission was left with the impression that efforts to keep these rules current and relevant have been either nonexistent or unsuccessful. The Commission was advised that a re-draft of the rules is underway but that the formal procedures required to give the revisions the status of regulations are a frustrating hindrance to progress.

b) CN Rail General Operating Instructions – Form 696

The second level of instruction to operating crews is a set of rules developed by CN management for exclusive use on CN Rail. An equivalent but different set of rules is in use on CP Rail.

This document includes interpretations of some of the rules contained in the UCOR and specific instructions as to how they are to be applied. It also deals with subjects not covered by the UCOR such as the use of radios and the requirements for testing and inspecting equipment prior to and after departure. CN does make an effort to keep the General Operating Instructions current. The last revision came into effect on June 1, 1985.

c) Time Table

A third level of instruction is specific to each region of CN's operation and to particular subdivisions within each region. These are the time tables which are normally published once or twice a year. The time table in force at the time of the collision was the CN Mountain Region Time Table which went into effect on Sunday, October 27, 1985.

Within that document are a number of special instructions relevant to train operations within the Mountain Region. There are also five pages of instructions specific to operations in the Edson Subdivision. The first of those pages is reproduced in Appendix 3 to this Report. It indicates the channels upon which radio communications are to take place as well as some details as to the features of the route between Edmonton and Jasper.

The Commission noted that the time tables in use on the British Columbia Railway include a profile drawing of the subdivision, similar to the profile shown in the map on page 18 of this Report. As several witnesses expressed concern that frequently, running crew members are not adequately familiar with the territory over which they are travelling, the Commission is of the view that the inclusion of a track profile in the time table would be a useful improvement.

Possibly the subject given the least attention in the time table is time. In areas where Centralized Traffic Control is in effect, no trains are scheduled other than passenger trains. The only times to which the time table refers are the departure and arrival times of passenger trains.

d) Monthly Re-Issue Bulletins

Each month the Mountain Region management publishes a bulletin of specific instructions. These publications include general instructions for the whole of the Region and specific instructions for various subdivisions. The February, 1986 re-issue bulletin contained special instruction necessitated by winter conditions.

There were two specific instructions for the Edson Subdivision, one of which referred to the existence of rails and track material on the south side of the main track between the siding at Medicine Lodge. The Commission was advised that neither instruction had any significance to the events of February 8.

e) Other Sources of Rules

There are several other publications containing instructions for CN employees. These include the CN Safety Rules, a booklet of instructions on the use of CN radios and a booklet of instructions for engine and train handling. There are also publications intended for use by employees in non-running trades. These include a book of rules governing signal inspection and testing, a set of instructions for the inspection and testing of air brakes and a manual of instructions for train dispatchers. The content of these publications is often more in the line of advice rather than rules.

2. Running Trades Attitude to the Rules

CN running crew employees receive training in the rules prior to being certified for duty. The training procedures differ for the various trades. Engineers attend a course at the CN training school in Gimli, Manitoba. Trainmen and conductors obtain their instruction at various places including Edmonton.

Rules instruction is followed by written examination. There are different examinations for the different positions in the running trades and non-running trades.

Employees are required to requalify, that is to write another exam, at intervals of two years. CN provides the opportunity to employees about to write the requalifying exam to have refresher instruction in the rules, but this is not mandatory.

The Commission was advised that there are occasional meetings held by management to discuss various provisions in the rules and the Union itself occasionally convenes meetings of its members for that purpose. The Commission was not convinced that these programs are adequate to ensure that employee knowledge and understanding of the rules is maintained at the highest possible level.

The crew members who gave evidence were consistent in their statements that they appreciated the fundamental importance of the rules to the safe operation of trains. If the statements of these witnesses was all the Commission had on the subject, there could be no doubt that running crew members have a high level of respect for the rules governing their activity.

Other evidence led the Commission to seriously doubt the reliability of that impression. Examination of the statements and testimony of only those running crew members who participated in the movement of five or six trains on the morning of February 8 in the hours preceding the collision revealed numerous situations where the rules were clearly violated and several situations where they were at least arguably violated. The violations ranged from failing to do proper brake and radio tests as required by the CN General Operating Instructions, to failure to perform predeparture inspections of the trains or proper inspections of passing trains as required by both the UCOR and the CN General Operating Instructions. A CTC official who gave evidence to the Commission at the Commission's request reviewed the statements and testimony and identified 19 possible rule violations.

Of even greater concern than the number of violations was the fact that most of them were commited in a highly visible and open manner in the presence of other employees. The evidence thus demonstrates that there is significant disparity between the regard that crew members hold for the rules in theory, and the regard they hold for them in practice.

3. CN Management Attitude to the Rules

The evidence also provided reason to question the attitude of CN management itself to the rules.

Several of the rule violations which occurred on the morning of February 8 arose because Train 413 was taken "on-the-fly". Evidence presented to the Commission established that this crew exchange procedure was not uncommon at Edson and, although the senior official in charge at Edson denied having any knowledge of it, the Commission cannot accept that management was unaware that the procedure was being regularly followed.

To permit such a procedure to be employed is to display a remarkable and unacceptable contempt for the rules. If management truly is not aware of the practice, the situation is even worse. It indicates an even more remarkable and unacceptable lapse in the supervisory function of management.

The low level of management respect for the rules was also evident in more subtle forms. For example, one of the violations noted in the activities of Trainman Edwards on the morning of February 8 was the manner in which he inspected Trains 354 and 202 when they passed Train 413 at Medicine Lodge. The rules clearly required that he be on the ground and on the south side of the track to perform that inspection. He was on the ground for at least part of the time that the trains were passing but was never on the south side of the track.

Some witnesses explained that there is a gully on the south side of the track at that point making compliance with the rule difficult. This evidence was not disputed by CN and left the Commission wondering why such a condition could be allowed to exist at a place where compliance with the inspection rules must be required frequently. This situation is perhaps indicative of the attitude which CN management holds to the rules.

Another indication of the management attitude to the rules is provided by the casual manner in which CN fundamentally amended one of the provisions of its General Operating Instructions, Rule 3.2(b). This is described later in the Report. It is there concluded that the amendment was made without concern for, or appreciation of, the consequences it might have on safety.

a) Supervision and Discipline System – Engineer Hudson

The system by which management monitors and ensures running crew compliance with the rules is of fundamental importance. It must include efficient means of determining whether or not crews are complying with the rules and effective means of enforcement when it is found that the level of compliance is wanting.

The Commission found it instructive to examine the application of CN's policies and procedures relating to supervision and discipline in the case of Engineer Hudson. Originally the Commission looked into Hudson's disciplinary record to see whether it confirmed the evidence led by Counsel for the Brotherhood of Locomotive Engineers to the effect that Hudson's reputation among his co-workers was such as to render it unthinkable that any default on his part could have contributed to the accident.

Witnesses described Hudson as a "top notch engineer" and a "100 percenter". One witness said, "Mr. Hudson was one of the better ones . . . he was really on the job when he was there." Another said, "I always knew him to be a very efficient railroader. He was very interested in his work . . . never disappointed in him."

Engineer Hudson's reputation was clearly something to which those concerned with the Commission's inquiries attached substantial significance. Hudson's CN personnel file, however, gives a markedly different impression of his record as a locomotive engineer.

More significantly however, the examination exposed reason for concern as to CN's policies and procedures with respect to supervision and discipline generally.

The disciplinary policy at CN is founded on a system of cumulating demerit points. Violations of the rules, if detected, may result in an assessment of demerit points against the crew members involved. Demerit points can also be assessed for conduct not related to the running rules but otherwise justifying discipline. The number of demerits assessable for any particular incident is at the discretion of the management officer dealing with the matter. When an employee accumulates 60 demerit points his employment is automatically terminated. If an employee with demerit points works for one year without another infraction, up to 20 points are removed from his total. The discipline system also contemplates disciplinary measures less severe than the awarding of demerit points – for example a reprimand letter on the personnel file – where the circumstances warrant.

Hudson had been assessed demerit points 4 times in his career. The greatest total accumulation he had was in September 1983 when his demerits amounted to 50 points.

Three of the incidents for which Hudson had been given points involved his improperly operating his train through switches. On the first occasion, in January 1977, the violation resulted in damage to the switch. On the second, in January 1983, two diesel units derailed. On the third, in September 1983, there was a side collision of two trains in the Jasper yard. The first and second incident resulted in assessment of 10 demerits each, the third, in 15.

An incident in August 1982 resulted in 25 demerits being assessed against Hudson. He had refused to continue a trip after a number of frustrating circumstances caused him to lose his composure. The record of the incident appeared at first to the Commission to indicate completely irrational conduct on the part of Hudson, but further exploration suggested that it was more likely that he was staging a one man protest against temporary inefficiencies, inconveniences and frustrations that were the product of a construction project in the Jasper area in the summer of 1982.

While the incident did not involve any unsafe practice by Hudson, it served to demonstrate to the Commission that, as one would expect, there was a limit to the stresses Hudson could tolerate. That the other Jasper running crew employees were able to operate in the same frustrating circumstances without such reaction, suggests that Hudson was more sensitive to stress than his co-workers.

Having accumulated 50 demerit points Hudson was interviewed by Mr. W.J. Deer, the Assistant Superintendent, Alberta Central Division, on February 1, 1984. This interview was held pursuant to CN's disciplinary policy for the purpose of discussing Hudson's record and ensuring that he was aware that 10 more points would result in his dismissal.

Subsequent to the interview there were two further incidents, either of which might have resulted in further demerits had the management officers who dealt with them been so inclined.

The first, in January 1984 was an incident where Hudson and several other crew members were deadheaded by bus to McBride to be available for trips back to Jasper. The crew members were upset on arrival in McBride to discover they would be laid over there for longer than it seemed to them should have been the case had there been proper planning in the dispatch office. They all booked sick in protest. Formal statements were taken but no disciplinary demerits were assessed against any of the men involved.

The second incident was in August 1984. Hudson was clocked by radar operating a train at 19 miles per hour in an area to which a 10 mile per hour temporary slow order applied. According to Assistant Superintendent Albert Wagner, a 10 mile per hour slow order is the most restrictive slow order that is imposed. He said its use is very rare and is confined to circumstances where travel at any greater speed is considered unsafe. In Wagner's view, travelling at 19 miles per hour in such a territory was a very serious infraction of the rules. In this case, no assessment of demerits was made because Hudson's record did not show any previous speeding infractions. When one considers the totality of Hudson's record this explanation seems ludicrous. It was however decided by the CN officer handling the matter, that a letter on his file was sufficient.

Since speeding and other "less serious infractions" noted for the first time by a supervisor in the process of train riding would not likely be recorded, and since the procedures used in monitoring speed by radar render that process most unlikely to catch offenders in any event, the silence of Hudson's file is not a reliable indicator of no previous infractions. There could have been several infractions observed by different supervisors on different occasions, none of which would be noted as each supervisor would not be aware that what he observed was a repetition.

The officer handling the discipline on this occasion, Mr. Lyle Umpherville, the Edson Trainmaster who was relieving in Jasper at the time, was aware that Hudson's demerit accumulation stood at 50 points at the time he considered this incident. Whether that knowledge influenced him not to assess demerits and possibly cost Hudson his job is a matter about which speculation two years later can not be profitable. Mr. Umpherville did consult with his superior, Mr. McGinley, the Assistant Superintendent in Kamloops prior to making his decision.

At very least, however, if the incidents subsequent to Hudson's accumulation of 50 points did not justify the assessment of further demerits, they might in the circumstances be expected to have prompted a substantially upgraded level of supervision of his activity. The combined indications of his discipline record and his alcoholism surely made Hudson an employee whose performance should have been kept under close watch. The supervisory officers in CN under whom Hudson worked did not apparently so assess the situation.

b) Supervision and Discipline – Policy and Procedures

The Commission was unimpressed with the effectiveness of the techniques of supervision employed by CN.

There are really only two techniques employed – train riding by supervisory personnel and radar surveillance of the speed of trains.

The Commission was not impressed that either of these methods is effective in determining the extent of rule compliance. CN acknowledged that train riding is not an effective means of detecting intentional disobedience of the rules. When a supervisor is on the train the only type of rule infraction that can be expected is one flowing from ignorance.

The Commission was surprised to hear that in most cases, the engineer of a train will be aware that the train speed is being checked by radar. No attempt is made to hide the radar equipment. In fact on occasion the management officer will contact the train by radio and advise the engineer directly that a check is being made. The procedure is viewed as more of a test of the accuracy of the train's speedometer than of the engineer's compliance with the rules.

These characteristics of the surveillance procedures are considered entirely appropriate by CN management. Mr. Ross Walker, CN's Western Canadian Vice-President, advised the Commission that CN deliberately eliminates any element of surreptitiousness in supervision. It is CN's experience that covert techniques make both supervisors and employees resentful of the process. It doesn't make for a "happy ship". It seems to the Commission, that the choice between a resented process and disrespect for rules essential to safety is not difficult to make.

The application of the discipline assessment system in the case of Hudson demonstrates that the maintenance of records of past infractions is deficient. The policy is not to record any first offence unless the matter is considered serious. Too often the matter is only considered serious where it has resulted in an accident or damage. The effect of the policy is that the recognition of a violation as a second offence relies on the memory of the supervisory personnel involved and on there being very little turnover among that personnel.

The Commission is also critical of the policy by which the assessment of demerit points for any particular incident is made. The policy is not to refer to the record of past demerit awards for the employee under consideration except in situations where the situation is one of a repeat violation of the same offence. Accordingly, a serious speeding infraction, in Hudson's case, received no demerit allocation because it was the first recorded speeding infraction. The previous infractions of unrelated rules were not considered.

The Commission concludes that the system of supervision and discipline in use at CN has characteristics which render it ineffective as a tool for promoting a high standard of respect for, and compliance with, the operating rules. In fact the attitude of CN management to the rules is capable of encouraging a disrespectful attitude among the employees.

In this regard the Commission finds itself in complete agreement with the comments of the Canadian Transport Commission in the report of its investigation into the Trudel accident.

> Throughout this inquiry, at the hearings and on our field inspections one nagging factor continued to surface – although without explicit or concrete evidence. The impression we gained is that the supervision of operating employees may not be as diligent as it should be. It is our opinion that this factor could influence the attitudes of employees towards safety – to disrespect the rules . . . .
>
> . . . Rule adherance is the carriers' responsibility. To us, a violated rule is not only the direct fault of the employee(s) involved, but also reflects on the quality and adequacy of the employees' supervisors which in turn reflects on the regional and perhaps corporate management. Managers and supervisors should also very often share the blame. In this respect, we would advise CN to embark on a program that would touch all levels of relevant management, supervision and employees that the rules CN teaches so well are adhered to and practised, for we have doubts that the maximum effort is in fact being exerted to ensure that all employees have the proper respect for and attitude towards the UCOR and other requirements for safe modern railway operations.
>
> *The Trudel Collision*, p.63

The Commissioners went on to recommend:

> CN should review the overall adequacy of its supervisory and management personnel in its St. Lawrence Region with respect to their practices in monitoring and enforcing the provisions of the UCOR and any other safety related rules of the Company . . . .
>
> CN should embark on a program to heighten the awareness of all supervisors and management personnel on the need for employees to adhere to the UCOR and otherwise to instill a safety-conscious attitude amongst operating employees.
>
> RTC should order CN to report to RTC on the progress in the above areas within three months hereof.

The Trudel Collision, p.71

Mr. Jack M. White, Assistant General Manager of Operations and Maintenance for CP Rail's Pacific Region described the policies and procedures of CP Rail relating to supervision and discipline.

The Commission derived the impression from this evidence that at CP Rail rule compliance monitoring is given a much higher priority by management than is the case at CN.

At CP this subject is referred to as "efficiency testing". CP provides supervisory personnel with a booklet entitled "Instructions for Conducting and Reporting Efficiency Tests". The introduction to that booklet describes both the policy and the two main categories of procedures used at CP:

> *EFFICIENCY TESTS*
>
> The objective of operational testing and inspection is:
>
> 1. To eliminate human-failure accidents;
> 2. To improve employee compliance with Operating Rules;
> 3. To determine the degree of compliance or failure to comply with Operating Rules; and
> 4. To determine on what rules and in what areas concentration is needed to improve employees' knowledge of the Operating Rules and special instructions.
>
> *TYPES OF EFFICIENCY TESTS*
>
> A. Observation
>
> A casual observation test is the routine observation by an officer during normal supervisory functions for compliance with rules and instructions.
>
> This type of test stresses the daily supervisory role of observing employees, in their working environment for rule compliance. Officers cannot be indifferent to violations. Officers must clearly and firmly indicate to employees that CP Rail demand (sic) rules compliance. Officers are expected to take time to bring to the attention of the employee any violation observed and the corrective measures the employee must take to avoid future violations.

B. Created Tests

A created test is a planned procedure to evaluate compliance with rules and instructions, without the employee's knowledge. This type of test may involve factors such as the burning of fusees or the placement of torpedoes to bring certain Operating Rules into effect.

Testing is not intended to entrap an employee into making an error, but is used to measure proficiency and isolate areas of non-compliance for corrective action.

Division Superintendents will coordinate transportation, engineering and mechanical officers for availability and participation.

The booklet describes many different tests that supervisors can use in carrying out this policy. Some of these involve shunting the track circuits to test running crew reaction to unexpected red signals.

Of course care is taken to ensure that the test itself does not create any unsafe condition. The instructions state, ". . . when jumper cables are used to activate signals they must be applied sufficiently in advance to ensure against changing indication of any signal already accepted by an approaching movement." Mr. White also stated that supervisors are encouraged to use their own ingenuity to create tests not covered by the book.

He further advised the Commission that CP Rail does not share CN's concern that aggressive and surreptitious monitoring has a damaging effect on employee morale. In fact, Mr. White said that although running crew members are occasionally heard to grumble about the aggressive techniques employed by CP's supervisors, the majority value the positive safety benefits produced by the CP program.

One further feature of CP Rail's program which the Commission considers of significant value is that after a crew has been tested it is advised of that fact and of the result of the tests. Employees are thus made to know, after the fact, that their conduct has been observed. This serves to convey to running crew employees the degree of importance that management attaches to rule compliance.

The Commission concludes that the system of supervision and monitoring used at CP is much more likely to instil a high level of regard for the Operating Rules among running crew members than that used at CN.

4. Recommendations – CN Supervision and Discipline

The Commission recommends that CN re-evaluate its policies and procedures with respect to supervision and discipline, and introduce such changes as are necessary to establish an effective means of ensuring that running crews carry out their duties in strict compliance with the rules.

In particular, the Commission recommends that CN instruct its supervisory personnel to give rule compliance monitoring a high priority and that it take steps to ensure that the supervisory actions of its operations managers convey to running crew employees that such a priority has been established.

The Commission also recommends that CN adopt effective monitoring techniques. In particular, it is recommended that a system of created efficiency tests of the type employed at CP

Rail be adopted as the first line of supervisory action. It is not intended that there be any decrease in the rules monitoring currently in place. It is recommended that this form of supervision be intensified.

The Commission recommends that CN alter the fraternal approach it takes to this subject. If a strict approach to rule enforcement results in labour management stress, some means of relieving that stress other than lax supervision must be found. It is essential to their effectiveness that supervision techniques be surreptitious and aggressive.

The Commission also recommends that CN review its policies with respect to the recording of discipline. The system of cumulating demerits was adopted to ameliorate the harshness of automatic dismissal upon any breach of the rules. No further amelioration is necessary. Any breach of the rules must at least be recorded so that it can later be identified as a first offence. Discipline demerit awards should be determined on the basis of the entire disciplinary record. Previous breaches of the rules should be considered in determining the number of demerits to be awarded even though they did not arise out of breaches of the same rule. If an employee has demonstrated a disregard for safety in previous disciplinary proceedings, it is the second occasion of disregard that is material not that the disregard is manifest in a second breach of the same rule.

It is recommended as well that CN establish a policy of increased supervision and monitoring of the operations of any crew member whose total demerit points exceeds 40 points. He should be required to take refresher courses in the rules and to pass a special examination before being allowed to continue to operate trains. Further, supervisory personnel should be particularly vigilant in ensuring that such an employee's operations are frequently monitored and submitted to creative efficiency tests. The Commission also recommends that the CTC take whatever steps are necessary to determine whether or not CN alters and improves its policies and procedures in this regard. If there is no evidence that CN has adopted an improved program of rule compliance supervision, then the CTC should take such steps as are required to bring about this result.

5. Government Involvement

The Railway Transport Committee of the Canadian Transport Commission is the Government agency responsible for regulation of the operations of railways in Canada.

The RTC functions in essentially three different ways in the regulatory process. First, it takes part in the making of the rules which govern train movements. Second, it is involved in the enforcement of those rules and, third, it undertakes investigations of accidents.

In the exercise of its rule making function the RTC has caused the UCOR to be given the status of a Federal Government Regulation. While this gives the rules which govern train movements the status they ought to have, it has also created one of the main impediments to keeping the rules current. Apparently proposed changes to the rules encounter immovable obstacles when attempts are made to put them through the process by which Federal Government Regulations are promulgated. Reform initiatives are accordingly frustrated and the rules continue in force with anachronistic provisions, the presence of which compromise the establishment of healthy respect for the rules among running crew employees.

The RTC rule enforcement activity is inadequate. The RTC does have a staff of field agents who ride trains and observe violations of the rules and report these to the railways. It is not evident that this technique of surveillance is any more effective when performed by RTC officers than it is when performed by railway management supervisory personnel. If any discrepancies in rule

compliance are noted, the RTC officer brings these to the attention of the railway's management and requires management to take some action to remedy the situation in the case of continuing non-compliance or to take appropriate disciplinary action against an offending employee. The evidence is less than convincing that this procedure is effective.

The size of the RTC staff which is assigned to this surveillance is remarkably small. For the entire Alberta region – for both CP and CN, there is but one officer, who attempts to travel on each subdivision at least once a year.

In the Report of the Mississuaga Railway Accident Inquiry the Honourable Mr. Justice Samuel Grange observed that the Canadian Transport Commission had a deliberate policy against prosecutions of offenders against the *Railway Act* (and presumably Regulations under that Act such as the UCOR) preferring to obtain compliance by persuasion rather than prosecution. He quoted the decision of Riddell, J. in *R.* v. *Michigan Central Railroad Company* [1907] 10 O.W.N. 660 at 668:

> I reiterate that it is my firm, well considered opinion that the best way to prevent similar occurrences, accidents or crimes, whichever word may be selected, is to make it more costly for railway companies to violate the law than to observe it. The great defect in our system is the want of some officer whose duty it is to watch for offences against the law and cause offenders to be prosecuted. Substantive law and legislation we have enough to spare, but we have always failed to provide prompt and sure methods for the detection of offences. The practice of shipping explosives in the manner disclosed in this case has apparently been going on for years without detection, and it would not even now have been discovered had not the explosion happened. Neither does it always follow that, when an offence against the law does become obvious, it is prosecuted.
>
> *Report of the Mississauga Railway Accident Inquiry*, p. 191

Mr. Justice Grange went on to observe:

> . . . when Parliament has legislated an offence and a penalty, the enforcement agency should be slow to adopt a policy of no prosecution for that offence. To the extent that the Minister of Transport or the CTC believe that the existing offence and penalty sections are outdated or inadequate to achieve reasonable enforcement of the *Railway Act*, the Minister should consider placing before Parliament appropriate amending legislation.
>
> *Mississauga Accident Inquiry*, p. 192

The situation described by Mr. Justice Riddell in 1907 and by Mr. Justice Grange in 1980 still exists in 1986. The RTC's policy is still one of persuasion rather than prosecution. Surely that policy should be abandoned in light of the deterioration of the respect held by both the railways and their employees for the rules governing train movements, as observed by both the CTC in the Trudel collision investigation and by this Commission.

Several witnesses observed that there is a fundamental conflict between the RTC's rule making role and its supervision and enforcement role. In its rule making capacity, the RTC promulgates regulations intended to promote safety. In its supervision capacity, it is called upon to be critical of the quality of the rules it has established. The same agency cannot be expected to perform both functions. As one witness observed:

> We have a conflict of interest situation where you have one institution and one body which is responsive for both regulation and safety. And these are conflicting interests for obvious reasons.

> If regulations are inadequate from the point of view of safety, they obviously cannot be investigated and effectively administered by the same institution that makes them. There is a conflict of interest. Safety must be a totally separate activity. I think any engineer who had to do with manufacture of anything knows very well that the shop that makes the piece can never be responsible for adherence of this piece to the specification. It must be somebody else who checks it, otherwise there is a conflict of interest. And the only way to resolve it is to have an independent body.
>
> *Transcript of Proceedings*, May 9, 1986, Volume 32, p.4618 – Dr. J. Lukasiewicz

6. Recommendations – Government Involvement in Regulation of Operations

The Commission recommends that the Government take immediate steps to make the Uniform Code of Operating Rules current and thereafter to maintain it in that condition.

The Commission also recommends that the regulatory system be restructured so that the rule making function is not assigned to the same agency as the supervisory, enforcement and investigation function.

The Commission also recommends that the agency charged with supervision, enforcement and investigation be given adequate manpower for the effective fulfillment of its function.

Finally, the Commission recommends that the agency charged with enforcement of the rules adopt a policy of prosecution of railways and individuals who are in breach of them and that any legislative amendments necessary to permit the effective adoption of such a policy be given high priority. In particular, it is recommended that a procedure be adopted similar to that established by Sections 6.6 to 7.2 of the Aeronautics Act by which the Minister of Transport may assess penalties for certain designated offences using a summary procedure which includes a right of appeal. This would be in addition to conventional prosecutions.

I. Assurance of Engineer Response to Signals

As previously stated the Commission finds that there was no malfunction in the signal system on the morning of February 8. However, the signals do not by themselves control train traffic. They give messages visible to the locomotive engineers which instruct the engineers to take action in response. This response is as integral a part of the traffic control system as the message displayed by the signals.

The traffic control system does include some features intended to ensure that the engineer receives the signal instruction or to eliminate the unsafe condition that will flow if an engineer does not respond properly to a signal. These include mechanical appliances which are installed in every locomotive and operating procedures intended to ensure the alertness of engineers.

The head end crew on Train 413 did not respond to either the message displayed by the approach signal or the home signal at Dalehurst. Obviously the features which exist to ensure proper response to signals did not function properly. Specific attention to these features was therefore necessary.

1. Safety Control Appliances

Canadian Transport Commission General Order 0-21, Section 30 provides:

> (1) The operating cabs of motive power equipment shall be equipped with a device or devices that, should the engineer become incapacitated, will automatically apply not less than a full service application of the train brakes and reduce the transmission of power to all driving axles in order to bring the train to a stop as expeditiously as possible.
>
> (2) The safety control mentioned in Subsection (1) must be maintained in good condition and shall be given frequent functional tests to ensure its effective operation in service.

The regulation is not specific as to the design or specification of the device to be installed. Two different devices are used by CN in its locomotives.

(a) Deadman's Pedal

The first device used by CN is the safety control pedal usually called the "deadman's pedal". It consists of a foot pedal on the floor in front of the engineer's chair. When the engine brakes are not engaged the engineer must keep the pedal depressed to the floor. If the pedal is allowed to come up off the floor an alarm whistle sounds. If the pedal remains undepressed for six seconds notwithstanding the whistle, there will automatically be a full service brake application and the engine power will be reduced to idle.

The operational theory of the deadman's pedal as a safety device is that if the engineer becomes incapacitated his foot will fall off the pedal, the pedal will rise and if the alarm whistle doesn't restore the engineer's attention, the train will come to a controlled stop.

(b) Reset Safety Control

The second type of device used by CN on its locomotives was developed in the mid 1970's. It is an electronic device designed to ensure the alertness of the engineer and is usually referred to

as the reset safety control (RSC). This device is designed so that a light mounted on the control panel will begin to flash and a whistle in the cab will begin to sound with increasing intensity, unless the engineer within a preset interval uses one of six different train controls or pushes a button on the control panel.

If the engineer uses a control or pushes the button, the device will "reset" and the time interval will begin again. The duration of this time interval varies from 20 to 127 seconds depending on the speed of the train. The subsequent warning sequence of lights and whistles lasts about 23 seconds. If the engineer has not responded in this time, a full service brake application will result.

(c) Bypassing of Deadman's Pedal

The evidence received from many members of the running trades was that many engineers habitually use some means other than their foot to hold the deadman's pedal down thereby effectively rendering this safety control system inoperative. This conduct on the part of locomotive engineers is not simply knavery. They are at times motivated to artificially depress the pedal because of the discomfort produced by having to maintain their foot on the pedal for long periods of time. However, the fact that the pedal is left artificially depressed for long periods – even for entire trips – suggests that more than temporary relief is sought and it must be concluded that the behavior is irresponsible. It is in fact in violation of CN Safety Rule 218 which reads:

> Do not block or render inoperative any safety devices with which a diesel or steam generator unit is equipped.

Whether or not CN crew members are aware that their conduct violates a specific safety rule, it is clear that they recognize the conduct is unacceptable. The reluctance of some to admit it, and the fact that they do not bypass the pedal when a supervisor is riding with them, amply demonstrates this.

The lead locomotives of both Train 413 and Train 4 were equipped with a deadman's pedal. The evidence is inadequate however to permit the Commission to determine whether the deadman's pedal on either train had been rendered inoperative by the engineers. Witnesses who had worked with Engineer Hudson in locomotive cabs indicated that they did not know what his habit with regard to the deadman's pedal was. They could neither confirm nor refute that it was his practice to bypass it.

Having regard to the fact that there was no brake application on either train and to the consistency of the evidence of running crew members that the deadman's pedal is routinely blocked out, the Commission considers it possible that the deadman's pedal had been rendered inoperative on one or both of the trains. In the case of Train 413 this possibility is heightened by the length of the time that Train 413 was apparently out of control.

The evidence demonstrated that CN management is under no illusion as to the effectiveness of the deadman's pedal as a safety control device. Mr. Douglas L. Fletcher, the Senior Vice-President of Operations for CN Rail advised the Commission that he had:

> . . . personally known that we had control problems with the deadman pedal for a number of years. We've done a number of things to try and overcome these problems. We've adjusted the tension on the pedal to minimum application to make it function as it's supposed to function. We've tried the hardnosed supervision approach. We've tried the development of an early alerter back in the mid-'60s along with the Vapor

Corporation and I think that there has been a considerable discussion at this Inquiry of our latest efforts called the reset safety control.

Transcript of Proceedings, June 12, 1986,
Volume 48, p.7135 - Douglas L. Fletcher

It is disturbing that a problem of such significance could be allowed to persist for so long. CN began to install reset safety controls in locomotives in 1978. The Commission was advised that up to 1985 CN had managed to install reset safety controls in 459 of their approximately 1,800 locomotives. The Commission is not impressed with the priority CN has given to this program of conversion and considers the slow progress to be evidence of a less than acceptable attitude toward the safe operation of trains.

Though there was some evidence that the reset safety control can be bypassed, and although some locomotive engineers express concern about certain features of it, and while its design permits the train to continue in motion for a period of time before a brake application occurs, the Commission is satisfied that the reset safety control is an effective safety control device and that if it had existed on the lead locomotive of Train 413 there is a strong possibility that this collision would have been avoided.

It was with distress that the Commission learned that the second unit of the locomotive consist of Train 413 was equipped with a reset safety control. That unit was not marshalled as the lead unit of the train because it was not a "comfort cab". Pursuant to an understanding with the Brotherhood of Locomotive Engineers, CN Rail routinely marshalls comfort cabs as the lead unit. One-third of CN's locomotives have comfort cabs.

The Commission is strongly critical of CN first, for not giving the installation of reset safety controls high priority, and second, for not ensuring that those installed were being used effectively. How a policy of marshalling comfort cabs in the lead position could exist without there being also a policy for the installation of reset safety controls in all comfort cabs is baffling.

In the course of the Hearings, the Commission was advised that CN had instituted a change in policy as to the marshalling of locomotive consists. The practice of marshalling "comfort cabs" in the lead would continue wherever possible but would give way to the marshalling of RSC equipped units in lead positions as a first priority. The Commission was advised that by January 1, 1987, 65% of "main line through – freight trains on single track CTC territory would be equipped with RSC's on the head end" (Douglas L. Fletcher, *Transcript of Proceedings*, Volume 49, pg.7146). It was also advised that by January 1, 1988 it would be possible to have comfort cabs equipped with RSC's in the lead position of all locomotive consists so as to resume compliance with the commitment made to the BLE previously mentioned.

It is also of great concern to the Commission that the CTC has been aware for years of the practical ineffectiveness of the deadman's pedal as a safety control device. To the knowledge of the CTC, trains equipped with deadman's pedals do not have an effective safety control device notwithstanding the regulation quoted above.

The CTC is staffed by persons who through years of personal experience with the railways are intimately familiar with the practices of running trade members. It is not conceivable that it has escaped the attention of these former railway running crew employees that bypassing of the deadman's pedal is a common practice among locomotive engineers.

The Commission was advised of a second method by which deadman's pedal appliances are rendered inoperative. There is a valve which can be turned to disconnect the pedal. This valve is

ordinarily sealed so that the pedal cannot be disconnected and rendered inoperative without breaking the seal.

The Commission was told that inspections were done by RTC personnel in 1985 of deadman's pedals in 5,341 locomotives. They revealed that the pedal had been rendered inoperative in 750 locomotives! In 524 cases inspection revealed that the seal on the valve was either missing or broken!

These inspections were done in 1985 and were said to be of concern to the RTC. However, up to the end of June 1986 RTC officials had not communicated with the operating officers of the railways to bring to their attention the CTC's distress at these findings although a form setting out the findings had been submitted to CN's mechanical maintenance personnel.

The Commission concludes that the failure of the RTC to ensure compliance with the regulations regarding safety control appliances, particularly when it was possessed of information which confirmed that there was not compliance, is shocking. Appropriate enforcement could conceivably have effected a change in the state of the equipment or the attitude of the running crews towards safety devices prior to February 8, 1986.

d) Recommendations – Safety Control Appliances

The Commission recommends that CN Rail continue with the program it advised the Commission it was undertaking, to ensure that reset safety control appliances are in place in all lead locomotives by January 1, 1988 and that in the meantime, priority be given to the use of locomotives which are equipped with RSC's in lead position over any other consideration. Consideration should also be given to the positioning of the warning lights of the reset safety control to ensure that there is no obstruction in the line of sight of the engineer.

It is recommended that all VIA Rail locomotives be equipped with reset safety control devices by January 1, 1988. The Commission also recommends that any new locomotives purchased by VIA Rail be equipped with a reset safety control device.

The Commission also recommends that CP Rail embark on a similar process of rapid installation of RSC's in its locomotives according to a time table to be approved by the RTC.

The Commission recommends that the RTC amend its regulations to provide that the deadman's pedal or other similar device does not constitute compliance with the regulation.

It is recommended that the RTC take such steps as are necessary to ensure that any employee who renders any safety control appliance inoperative, is prosecuted. It is also recommended that the railways dismiss such an employee.

It is further recommended that the RTC adopt a policy of immediately bringing to the attention of the highest level of CN management any information concerning interference with safety control appliances of the character described above. A railway tolerating such a condition ought to be prosecuted for violation of General Order O-21, Section 30(2). If more efficient legislation is needed to ensure compliance by running crews and railway management, it ought to be promulgated. The penalties for such infractions should be severe.

2. Remote Mechanical Intervention

Both of the mechanical safety appliances in use in Canada are designed to ensure alertness in the cab of the locomotive so that, in theory, those occupying the cab of the locomotive will respond appropriately to signal indications as they are encountered.

However technology exists for systems which ensure not only alertness but compliance. These systems are calculated to enforce compliance with signal indications whether the lack of compliance stems from inattentiveness in the cab of the locomotive or for any other reason. It is immediately appreciated that these systems have superior safety characteristics inasmuch as they enforce automatic and immediate brake application when a signal indication or speed restriction is not obeyed by a train crew. Further, the instruction to initiate a brake application is remote from the locomotive crew and thus cannot be bypassed by them.

Had this technology been in place on February 8, 1986 at Dalehurst, as Train 413 proceeded west from the Obed Summit, the systems would have sensed:

- the train was exceeding the appropriate track speed;
- the train was not slowing down when it passed the Dalehurst approach signal;
- the train was not going to be able to come to a stop as required by the Dalehurst home signal.

Depending on the degree of sophistication of the devices, remote intervention would have brought the train to a stop as soon as any of the above conditions were identified. Identification of these conditions would have prevented the collision.

There are several overseas railways and some transit systems in North America, that employ similar technology to ensure safe train movements through remote intervention or enforcement. The systems that incorporate this technology are variously referred to as Automatic Train Control, Wayside-Enforced Safety, and Radio-Linked Signalling. The major railroad systems in North America have embarked on a program which embraces the remote intervention and speed or authority enforcement technology. The Commission was very interested in this development and is indebted to a number of gentlemen that attended and described these developments.

Those who have provided the Commission with information had major responsibilities with regard to the development and introduction of an advanced train control system in North America. Some also had major responsibilities with their respective railways. The persons testifying were:

- Mr. Glen Wilson of the Union Pacific Railroad
- Mr. Morrison Renfrew of the Canadian Institute of Guided Ground Transport
- Mr. Peter Detmold, formerly with CP Rail and presently the Executive Director of the program
- Mr. Gary Pruitt of ARINC
- Mr. Gary Ruegg of the Union Pacific Railroad

The system described by these witnesses has been given the designation Advanced Train Control Systems (ATCS).

A brief description of the evolution and present state of development of that project is necessary.

The pioneering work on this concept in Canada was initiated in 1974 by British Columbia Railways in an innovative development known as the Location, Identification and Control (LIC) system. This attracted the interest of CN and CP. The ATCS project commenced around 1978 with discussions between several Canadian railways on the fundamentals for a new generation of train control systems. The project has since evolved into a major effort funded jointly by the

Railway Association of Canada and the Association of American Railroads. The project has an executive and a number of committees and technical task forces. They developed a multidisciplinary approach involving officials from some 16 different railway companies. They have also employed a consortium of system engineers and enlisted considerable support and great interest from the supply industry, who recognize a prospective market in the hundreds of millions of dollars.

The project relies on the adoption of existing technologies proven in other industries and their application to a railway train control system. It offers major economic incentives derived from cheaper installation costs, lower maintenance costs and increased productivity of plant, fuel and manpower compared to conventional systems. It is expected that significant improvement in overall traffic flow, reliability of service, and hence competitiveness for the Canadian railways will result. Fortunately, safety is a desirable companion of the economic benefits.

The Commission also heard from Mr. Ronald McGraw of Rockwell International who provided information with regard to a parallel system based on a slightly different concept but having the same objectives. That system was called Advanced Railroad Electronics System (ARES). This information was helpful in that it gave the Commission an appreciation of the economics, the time frames and some of the alternatives that are available to the industry. Mr. McGraw advised that ARES was a program that was being tested this year by a major American railroad and that all of the early indications led him to believe that there would be an early introduction of that system of train control.

a) Levels of ATCS

The concept of ATCS embraces a family of systems ranging from simple to complex and is intended to accommodate lines of varying traffic density and differing traffic control systems. There are four distinct levels of ATCS. They are modular and designed to allow the addition of options of increasing complexity at each level. The levels can generally be described as follows.

i) Level 10: Centralized Route and Block Interlocking System

This represents the foundation level and consists of basically a computer-aided manual block system. It would feature microprocessor based equipment only at the dispatcher's work station. Communication with trains would remain by voice radio. The computer would provide interlocking logic to prevent overlapping authorities from being issued.

ii) Level 20: Automated Transmission and Display of Instructions

A vital data communications link coupled with the installation of microprocessor-based equipment on locomotives and other mobile equipment would be added to Level 10. This would become the principal means of communicating authorities for movement. A display unit on the locomotive would permit receipt of and require acknowledgement of movement authorities, making a block overlap theoretically impossible. Communication of other information such as upcoming meets and train lineups would also be facilitated.

iii) Level 30: Full Train Tracking

An automatic location and identification system is introduced at this level to keep track of train location and identity. This information is available to both the control station and the crew. This ability to continually monitor train location permits the speed of the train to be determined automatically for the purpose of remote intervention.

Options available at this level include:

- Automatic reactive or predictive braking to enforce speed or authority limits (remote intervention);
- On board display of current allowable speed, next allowable speed and distance to speed change;
- Automatic clearing of authority limits;
- On board route – characteristics display to assist in safe and efficient train handling;
- Automatic conflict resolution and projection of train paths by the central dispatch computer;
- An automatic alert transmitted to the dispatcher and other trains in the event of an unexpected emergency stop;
- Train prediction information for field forces;
- Progressive timely display of slow order and work block information;
- Remote switch point monitoring and/or control available to the locomotive engineer;
- An option to calculate the most fuel efficient speeds for all trains and optimized performance through pacing;
- A train handling assist package to provide train handling advice to the locomotive engineer from analysis of route characteristics and train performance parameters.

iv) Level 40: Full Field Interlocking

The final level would provide full field interlocking with associated wayside communications. At this level ATCS would be superimposed over existing CTC installations and allow the dispatcher to control switches with route integrity, as provided by conventional CTC. All previous features and options of ATCS would be incorporated. Theoretically wayside signals could be done away with and the train could be remotely directed and controlled.

b) Development of ATCS

The development program for ATCS is ambitious. Significant progress has been made to date. The operational requirements have been defined, the system architecture established, the specification process is underway and several pilot projects are undergoing testing in conjunction with suppliers. In the near future it is anticipated that testing of components and systems on trains will take place; component and system certification procedures will be developed; the validation of vital software will be completed; and, industry sponsored research will continue.

Because ATCS is being developed by committees representing most North American railways, speed of implementation must necessarily be sacrificed in the interest of comprehensive industry wide development. The sacrifice of time must be weighed with regard to the advantages of scale that flow from modular system design and industry wide introduction. Cost is of course a factor and the introduction of very wide ranging changes to an industry as capital intensive as the railways makes this a very major consideration.

The Commission heard from both CN Rail and CP Rail that they are both committed to the development of ATCS and its introduction in Canada and elsewhere. It is clear that both railroads are supporting the program very actively and substantially with commitments of both time and key personnel.

These commitments are not surprising in light of the evidence that the introduction of ATCS will lead to very major economies and efficiencies. All of the witnesses knowledgeable on the subject expressed enthusiasm and optimism in contemplation of the benefits to the industry that ATCS ought to produce.

The Commission wishes the ATCS project Godspeed in reaching its goals and in doing so on an industry basis with all the concomittant advantages of scale, cooperative research and development, and advancement of technologies that that prospect holds.

c) Implications

First, it must be appreciated the primary impetus for introduction of ATCS is economic and not safety as such. For example, the ability to pace trains and regulate and enforce their behavior will effect huge savings on fuel and equipment costs. Precise calculations are not necessary to appreciate that the costs of stopping and restarting a 6,000 ft. train consisting of 121 cars and weighing 13,000 tons is very substantial. If speed and location of all train traffic is known, the patterns can be so orchestrated that speeds can be instructed and enforced and consequently stopping and starting for the purpose of meets with other trains can be more efficiently effected.

Second, it has been identified that the whole of the technologies upon which the concepts of ATCS are based are well known and developed in other fields. The "advanced" idea of ATCS is only an advance in the sense of molding these technologies to railway use.

Third, the remote intervention and enforcement aspects of ATCS are only to be introduced at Level 30 if present plans of evolution are followed. However these aspects of Level 30 are capable of being initiated now and subsumed when the other Level 30 components are put in place. That is, the capacity for remote enforcement exists now and has existed for many years. Swedish Rail (SJ) has, for example, a system which incorporates some of the ATCS features relating to both the regulation of train movements and the enforcement of speed limits by automatic intervention. That system features a transponder and an encoder that are designed to interface directly to existing wayside signal equipment to provide speed and stopping commands to the locomotive. Although the ATCS system is not intended to have an identical control process it will contain similar elements and equipment and the object of the systems in that regard is the same.

The Commission is concerned that these remote enforcement aspects of ATCS be introduced into the Canadian railroad system with all deliberate speed. The evidence received in that regard is that CN is committed in principle to establishing the Level 30 remote enforcement provisions on CTC main line but no definite time frame has as yet been established, although the Commission was advised that testing is to begin in 1988.

The Commission heard from CP that it is commencing certain testing with regard to ATCS but again no time table for the introduction of the remote control features has as yet been established.

The Commission learned that the RTC has been endeavoring to stay abreast of the developments of ATCS and Mr. Peter Detmold, the Executive Director of ATCS indicated that they were aware of the need to keep the RTC fully informed so that no intelligence gap in the regulatory agency would in the future be an impediment to early introduction of the program. It is important that this be the case.

d) Recommendations

The Commission concludes that ATCS in general must be encouraged and recommends the RTC immediately establish a task force to secure accurate and current information and to dedicate itself to the assistance and acceleration of the ATCS project. However, unless the remote enforcement features of Level 30 of ATCS can be implemented on the time frame outlined below, those features ought to be introduced in anticipation of the eventual introduction of Level 30. To the extent that that acceleration generates additional costs the government ought to consider the appropriate level of funding assistance. In making that recommendation this Commission wishes to emphasize that ATCS is anticipated to be of major economic benefit to the railways and any request for financial assistance ought to be weighed in this context.

Regulated industries such as railways are familiar with the imposition of deadlines and the Commission is of the view that the remote enforcement provisions referred to above are sufficiently important that a deadline for their introduction on all main lines of railways in Canada must be imposed.

The Commission therefore also recommends that the RTC (or such other agency as might be assigned to monitor this important matter) establish in conjunction with the railways a critical path schedule, whereby the remote intervention and enforcement aspects of Level 30 of ATCS will be in place on all CTC main line tracks in Canada by the end of 1989. As soon as possible after 1989, at least the remote enforcement aspects ought to be implemented on other secondary and branch lines. If such a cooperative and voluntary schedule is not committed to by the railways, or in the event any cooperative and voluntary commitment entered into is not complied with, then in such case a hearing should forthwith be ordered directing the railways to show cause why an effective form of remote intervention and control to enforce speed and authority limits cannot be implemented on all main lines immediately.

3. CN Rail General Operating Instructions Rule 3.2(b)

Rule 3.2(b) of the CN Rail General Operating Instructions establishes a procedure by which the rear-end crew is to determine either that the engineer has observed a signal, or if that cannot be determined to stop the train.

That rule reads as follows:

3.2 Conditions requiring the use of radio . . . .

(b) On express, freight, mixed and work trains, a member of the crew at the rear of the train must, when practicable, contact a member of the crew on the engine who must communicate by name the indication displayed by the following block and interlocking signals: . . .

(2) In single track CTC, and on subdivisions or portions thereof specified in the time table or special instructions, approaching the approach signal to all control locations . . . .

If crew on engine fails to respond to such calls, action must be taken by a member of the crew at the rear of the train, when practicable, to stop the train immediately.

The time table applicable to the Mountain Region contains the following special instruction for the Edson Subdivision:

General Operating Instructions – Form 696 . . . Item 3.2(b)(2) – applicable between Mileage 8.1 and Jasper.

Accordingly, it is clear that the rule applied to the approach signal to Dalehurst, Signal 1703.

a) Purpose of the Rule

The purpose of the rule is to require that the conductor take steps to satisfy himself as to the alertness of the locomotive engineer. As in theory the conductor is the senior officer on board the train, it seems only reasonable that some means of exerting that theoretical authority should exist. The procedure contemplated by this rule provides that means.

The rule is not one which is required by Government regulation. In fact, CP Rail does not have such a rule. CP Rail does have a rule which requires the engineer to contact the conductor periodically by radio when the train is operating under reduced crew (only one crew member in the caboose). This is intended to provide a means by which it can come to the engineer's notice that the conductor is in distress. The procedure was introduced at CP when permission was obtained to operate with reduced crews. A measure of security for the conductor is a byproduct of the CN rule but that is not its object.

b) Familiarity with Territory

The rule contemplates that the radio conversation will be initiated by the conductor. The conductor is supposed to make his call when the locomotive engine is nearing the approach signal so that the locomotive engineer is in a position to advise the conductor as to the display of that signal. This obviously requires the conductor to have an acute familiarity with the territory over which the train is running. Conductors accordingly establish landmarks along the route which they use so that they may know when to initiate the radio call. As trains are of variable lengths, conductors must be capable of flexibility in their procedure.

The evidence before the Commission was to the effect that Hudson had a reputation for frequently initiating the calls from the head-end. This was not in compliance with the rule but the establishment of communication between the head-end and the tail-end did, even without strict compliance, accomplishes the primary and secondary purposes of the rule.

c) Side Effect of the Rule

The procedure contemplated by the rule has a side effect which running crew members value. The unintended effect is that crews on trains in the vicinity of the train on which the end-to-end communication is occurring, will overhear the conversation and thereby become aware of the presence of the train in the vicinity. Evidence from the crew members of the two trains which passed Train 413 at Medicine Lodge and from the train that followed it was that the calling of the signals on Train 413 at Medicine Lodge and Hargwen had been overheard.

d) Application of the Rule to Passenger Trains

Rule 3.2(b) does not apply to the crews of passenger trains. Therefore, on passenger trains, signals are not called end-to-end. The Commission was advised that the reason for this difference is that the rear-end crew on a passenger train has responsibility in the area of passenger service which render it "impracticable" to originate calls to the head-end at the appropriate time.

This difference in procedure between freight and passenger trains was a source of concern to many of the running trade crew members who appeared before the Commission. They referred to passenger trains in this respect as "ghost trains" because they proceed through the territory without necessarily any end-to-end radio communication. Accordingly, other trains in the vicinity are not alerted to the presence of passenger trains.

For some time after the collision passenger train engineers operating out of Jasper adopted the practice of calling signals over their radios simply to announce their presence in the vicinity. Had there been such a procedure on the day of the collision, it is conceivable that Conductor Smith might have overheard the call and recognized the danger in the developing situation in time to initiate an emergency brake application. It is also conceivable that either of the head-end crew of Train 413 might have heard such a call and had his attention restored. The Commission commends the Jasper passenger train engineers for their initiative and suggests that the practice be adopted officially.

e) Compliance with the Rule by Conductor Smith

During the course of the Commission's hearings attention was given to the question of whether or not Conductor Smith's actions, as they were described in his evidence, were as required by this rule.

If he called the head-end as he claimed, he complied with the first part of the rule. The question is, if the facts were as he advised, was his acknowledged failure to pull the emergency brake in the caboose, a violation of the rule?

Conductor Smith's own evidence in this regard was as follows:

> Q. In the circumstances that you have described, do I take it, sir, that there was some point in time at which you felt that it was imperative upon you to apply the emergency brake?
>
> A. None.
>
> Q. Why, in the circumstances that you have described, did you not pull the brake?
>
> A. I felt that the engineer had the train under control. I felt that he was in fact doing what was necessary to control the train at that point . . .
>
> Q. In the circumstances that you have described, how could you be justified in reaching the assumption that you did that the train was under control and that the brakes, the emergency brake should not be applied by you?
>
> A. I felt that I would exhaust all other ways of contacting my head-end. I would have pulled the air if I thought there was an emergency situation. I would probably do it as a last resort.
>
> *Transcript of Proceedings*, April 11, 1986, Vol. 13, p.2014 – Wayne R. Smith

Smith said that he assessed the train's speed to be within the track limit and had the impression that a brake application had been made. These two factors, he said, led him to believe that the train was under control. He says he tried to contact the head-end repeatedly using first his grey radio and then his red radio. He said that none of his many attempts was successful.

It is unclear why, given his evidence that he would exhaust all possible means of contacting the head-end, he did not pull the emergency brake when he was unable to establish contact using either radio. There is no other means of contacting the head-end. By his own interpretation of the requirements of the rule, it would seem that the circumstances existed to justify his "pulling the air". Yet he did not do so.

His evidence is that he was using the red radio when the caboose passed the approach signal at Mile 170.2. The evidence of CN experts with regard to braking distances was to the effect that an emergency application initiated at that point or at any time until the locomotive reached Mile 172.26 would have brought the train to a stop prior to it entering upon the single track occupied by Train 4, assuming a speed not greater than 63 miles per hour.

f) Opinions of Other Running Crew Members

Many of the running crew employees who gave evidence at the Commission Hearings indicated that in similar circumstances they expected their reaction would have been the very same as that described by Conductor Smith. Many observed that there is some risk of danger involved in initiating an emergency application of the brakes. Some said that in certain circumstances this can cause derailment. Others seemed more concerned about danger resulting from the anger of the engineer at having had his train stopped and having to explain the situation to the dispatcher and management.

Curiously, late in the hearings there seemed to be a change in the position taken by the United Transportation Union on this point. It acknowledged that Smith's action had constituted a breach of the rule. It now suggested that in the circumstances his breach of the rule was understandable.

It was obvious to the Commission that the UTU had recognized that the procedure established by the rule is about the only practical control the conductor has over the train when he is in the caboose. The existence of the rule and the Union's support of it, is, without doubt, essential to the position the UTU will take in the upcoming debate on the question of whether the railroads should be allowed to run freight trains without cabooses.

The initial position taken by the Union and its members was obviously coloured by a deep sense of sympathy for what they perceived the plight of Conductor Smith to be. The latter position taken by the Union was motivated by considerations completely extraneous to the issues of concern to the Commission.

g) Amendment to the Rule

Rule 3.2 was amended when a new revision of the CN Rail General Operating Instructions was issued in June of 1985. Prior to that time the words "when practicable" did not appear in the rule either in the first paragraph or in the last paragraph.

Although CN denied it, it appears obvious from even a cursory review of the 1985 revisions that the reason for putting in the words "when practicable " was to remove from the CN Rail General Operating Instructions any impediment to the operation of cabooseless trains.

Other revisions which can have no other explanation were made at the same time. For example, the title of Rule 3.7 was changed from, "Red Radio Instructions" to "Red Radio Instructions – (Movements Equipped with Caboose)". Rule 1.20(a) which deals with seatbelts in cabooses previously read:

> On cabooses so equipped, employees must wear seatbelts fastened at all times when occupying cupola . . .

This was revised in June, 1985 to read:

> On trains and transfers, equipped with an operating caboose, and when so equipped, employees occupying the cupola must wear fastened seatbelts . . .

CN acknowledged that there was no consultation between it and the Unions and running crew members affected by Rule 3.2 preceding the amendment. Neither was there any instruction given to crew members as to the meaning of the rule after it had been amended.

The question obviously arises whether it could be maintained that the rule as amended imposes a less stringent standard of conduct than was required by the rule prior to it being amended.

h) CN Position

CN's interpretation of the rule after the change was described by at least three CN officers. That given by Mr. Ross Walker, CN's Vice-President for Western Canada was:

> . . .the purpose of the paragraph [the last paragraph of 3.2(b)] is to place on the crew on the rear of a train the responsibility to generate that call and to take action in circumstances where the appropriate response is not forthcoming. "When practicable" is simply a recognition that there may be times when that cannot be reasonably done; cannot be put into practice; is not the most or the highest priority activity at a point in time or he may not be able to do it. Nothing more than that.

It was the evidence of the three officers that the introduction of the words "when practicable" did not alter the requirement of the rule whatsoever. Mr. Douglas Fletcher stated that the words were added in order to allow the conductor to sort out his priorities. He explained what he meant by that was that the conductor would be relieved from the obligation to comply with the procedure required by the rule if there was some other mandatory requirement for him to take some action which made compliance with the rule impossible. Mr. Phillip Stephenson, a CN rule expert advised the Commission that he could think of no circumstance where it would be practicable for a conductor to comply with the first part of the rule but not practicable for him to comply with the second part. If he is in a position to make the call, he is in a position to react as required in the last paragraph of the rule if he receives no response. The purpose of the introduction of "when practicable" was not to grant a discretion to the conductor as to whether he should comply with the last part of the rule. No exercise of judgment or provision for a discretion was intended.

CN may not have intended to introduce any uncertainty into the rule by adding the words "when practicable". Indeed, it seems likely that it was not until after the collision that it even occurred to CN that the change was capable of being interpreted as having introduced an element of discretion. The explanations given for the introduction of the words "when practicable" have a flavour of after the fact rationalization. The Commission, as has been observed, believes there is substantial reason to conclude that the real reason for the change was anticipation of the cabooseless train debate.

The Commission concludes that whatever might be the proper interpretation of the rule, in its present form, in the absence of any authoritative pronouncement (there not having been any forum in which the issue has been determined authoritatively since June, 1985) the only reasonable conclusion is that the rule is capable of misinterpretation. Few conductors who appeared before the Commission had an unequivocal understanding of the rule.

i) Conclusions

The Commission concludes that if Smith acted as he said he did, his failure to apply the emergency brake when he did not receive a response, having used all available means of communication to the head-end was, even by his own interpretation of the rule, a violation of it. The Commission also concludes that CN bears a significant degree of responsibility for that non-

compliance. Changing such a fundamental rule in such a fundamental way without explanation, and without confirmation that no difference in the standard of conduct was intended, is to court laxity in the observation of the rule by running crew members and the type of disaster which can flow therefrom. The Commission concludes that the effect of the amendment has been to significantly reduce the quality of the rule as an assurance of appropriate engineer response to signals.

j) Recommendation – Rule 3.2(b)

The value of 3.2(b) can only be restored by removing any possibility that it might be interpreted as permitting the conductor any discretion in pulling the air if he does not receive a response to the call initiated in compliance with the first part of the rule. The Commission recommends that CN amend the rule to ensure that it cannot be interpreted as permitting the conductor any discretion.

There may exist situations where it is impractical for the conductor to comply with the rule by reason of other duties. However, the fundamentality of the rule to the usefulness of crew members being positioned at the rear of the train, renders it difficult to think of any other duties that could be considered of such importance that they could take precedence.

Mr. Stephenson cited the possibility that the conductor might be on the rear platform of the caboose inspecting a passing train as required by other rules thus making it impossible for him to initiate the Rule 3.2(b) call. The Commission recommends that the fundamentality of the rule be recognized by clearly giving it precedence over any other rule requiring action by the rear-end crew.

Accordingly, the Commission would recommend the complete removal of the words "when practicable" from the rule.

In addition to amending the rule, the Commission recommends that CN take such steps as are necessary to ensure that all crew members are aware that the rule does not provide to them any discretion whatsoever.

4. Oral Notification of Meets

The circumstances of the Hinton collision raised an obvious question as to why, given that there was easy radio communication between each train and the dispatch in Edmonton, the head-end crews of Train 4 and 413 were not advised by radio of the pending meet at Dalehurst. The transcript of dispatch-to-train communications which was produced to the Commission showed that each of the 3 trains which had been involved in the meet at Medicine Lodge about 45 minutes before the collision had been advised by the dispatcher in advance of that meet. The transcript of the conversation in which Hudson was so advised is quoted on page 26 of this Report. Why was there no radio advice of the Dalehurst meet given to Engineer Hudson on Train 413 or Engineer Peleshaty on Train 4?

The Commission was advised that there was no instruction to dispatchers to give oral notification of meets to train crews. CN in fact considers such advice tantamount to a violation of a rule which prohibits radio advice of a display of upcoming signals.

However, it occurred to the Commission during the course of the hearings, that oral notification of meets by dispatchers to train crews would be desirable. CN's adoption of the procedure established by Rule 3.2(b), as described previously, constitutes a recognition of the

importance of procedures intended to maximize and ensure the attention of head-end crews to signals. It seemed to the Commission that radio advice of meets from dispatchers to head-crews would be a valuable addition to that procedure.

The railways, however, vigorously opposed the suggestion that such a procedure ought to be introduced. They advanced many arguments as to why such a recommendation should not be made. The arguments can be divided into two basic categories.

a) Practicality of Oral Notification of Meets

The first category of arguments advanced by the railways was that the proposed procedure would be impractical. They said dispatchers are too busy to add such a procedure to their duties. The proposed procedure would be impractical as well because it contemplates an increase in the use of radios. The railways said that the radio communication lines are already overcrowded.

The railways also observed that such a procedure would constitute an impairment of the dispatcher's flexibility. It would limit his ability to change his mind as to where a meet would occur if he had already given the oral advice contemplated by the procedure. They also suggested that it would be impossible for a dispatcher to conform to a requirement that the advice be given at a precise time prior to a meet.

It may be that there are places on the railway system where dispatchers are too busy to carry out such a procedure. The Trudel collision report description of the activities of the dispatcher in the Drummondville subdivision of CN's St. Lawrence Region in Quebec on February 15, 1986 demonstrates that that subdivision is probably not one of them. If there are such places, there is no reason that an exception could not be made.

The suggestion was made that in areas where there is very heavy commuter rail traffic, for example in the Toronto area, oral notification of meets would be onerous for dispatchers. However, in such dense traffic areas there is double track which reduces the number of meets to almost nil if it does not eliminate them altogether. It seems unlikely that the proposed procedure would be too onerous, even in Toronto.

The Commission is satisfied that there is no merit to these arguments. Dispatchers in Edmonton, who control traffic on the route carrying CN's highest volume, are clearly not too busy to add to their procedures the calling of trains by radio to advise that a meet will occur at a particular station. On the morning of February 8, Dispatcher Zavaduk had ample time to advise each of the three trains that a meet was to occur at Medicine Lodge. He advised the Commission that he had given this advice because the meet was a "double meet" and accordingly, unless Hudson was made aware of that, it was likely that he would have called the dispatcher after the first train passed to inquire why he was not receiving signals to permit him to depart the Medicine Lodge siding. However, the dispatcher not only told Hudson of the meet, he also told the engineers on each of the other two trains in separate radio conversations. At the time, there were 4 trains on his territory and his duties were clearly not so onerous as to prohibit giving oral notification of the meet.

The records produced by CN for February 7, 1986, which it is assumed was a reasonably typical day, indicate that the maximum number of trains on the Edson subdivision at any given time did not exceed 7. The Commission is satisfied that there is no merit to the suggestion that dispatchers do not ordinarily have sufficient time to contact the trains regarding meets.

As to the suggestion that the radio channels are already too busy to permit the adoption of the proposed procedure, the transcript of radio conversations produced to the Commission clearly showed that there is extensive extraneous and unnecessary radio communication. Even so, there were longer periods of radio silence than of radio communication. The Commission is also confident that there is no merit to this suggestion.

Neither does the Commission find convincing the suggestion that the adoption of the procedure would constitute an unacceptable hinderance to the dispatcher's flexibility. The Commission does not contemplate that a dispatcher would give the oral notification until he has lined the route for a particular meet. The occasions when he changes his mind after having lined the route, are infrequent. It would not constitute a significant burden to so advise the crews by radio.

Regarding the suggestion that it is not possible to introduce a procedure requiring that oral notification be given at a precise time prior to a meet, the Commission does not propose that that would be a feature of the procedure. It is not necessary that the advice be at any specific time before the meet. The advice will be useful if it is given at any time. The time when the dispatcher lines the route would be satisfactory.

CN also suggested that present procedures require that any instructions given by the dispatcher to train crews must be written down and repeated by the train crews back to the dispatcher. They suggested that the necessity of incorporating that procedure into the oral notification of meets would render it time consuming and so add to the burden as to make it an unacceptable procedure. The Commission sees no reason why that procedure need apply to the oral notification of meets.

b) Effect on the Signal System

The main concern of the railways was that to give train crews notification of upcoming meets would introduce a potential hazard to railway operations. Crews would rely on the oral advice and give it priority over the instructions given by the signals. They would become less vigilant in observing the signals because having been told that a meet was arranged for a certain place, they would not need to be concerned about the signals. Some witnesses said that oral advice of meets would give crews a "false sense of security" – if the dispatcher failed to give the advice they would possibly not realize that there was any restriction on their progress, would ignore signals and collide with an oncoming train.

Each locomotive engineer who appeared before the Commission was asked his view on this subject. Some said they would greatly appreciate being advised of upcoming meets by radio. Others said that signals give them all they need to know and that the proposed procedure would not add anything useful. It was unanimous, however, that it would do no harm for them to be advised by radio of a meet and that such advice would not diminish the absolute priority of the signal instructions.

The Commission was impressed by the intelligence and capabilities of the running crew employees who appeared as witnesses. As would be expected, given the level of the salaries they are paid and the nature of the work they perform, these are men upon whom it should be possible to place considerable reliance. They are certainly capable of understanding and appreciating that whatever a dispatcher may tell them about a meet is to be considered mere supplementary information and not in any way information which defines, alters or reduces the paramouncy of the signal instruction. Providing more information to crews to ensure vigilance and safety cannot be construed as a step backwards.

Further, the instructions given by signals do not relate only to meets. They also inform the train crews as to the condition of the block about to be entered. Engineers know this well. There is absolutely no reason therefore why an engineer would interpret advice that a meet would occur two stations ahead as a licence to disregard all the intervening signals. Neither would he ignore a stop signal because he had not received advice that a meet would occur.

The Commission is convinced that the risk that a train crew would ignore signal instructions if a procedure for oral notification of meets was adopted is extremely remote and certainly far outweighed by the improvement to vigilance and safe train operations that it would produce.

The Commission considers it exceedingly valuable that dispatchers have an opportunity to ensure the alertness and responsiveness of head-end crews. The Commission agrees that oral notification of meets would create in running crew members a sense of security. Nothing about that sense of security would be false.

In the ergonomic study prepared for the Commission by Dr. Smiley, reference was made to a British study which, in 1881, proposed a block signal system as a technological improvement to the safety of the rail system existing at that time. The railroaders of the day opposed this improvement on the grounds that it could not be implemented safely and would create confusion. Those comments bear a striking resemblance to the arguments put forward to this Commission in 1986. Similarly, when the investigation into the Mississauga derailment recommended the extensive installation of hot box detectors, it was opposed on the grounds that crews would become less vigilant. Such detectors, however, are now a fact of life in the Canadian rail system and have had no effect whatsoever on crew vigilance.

c) Recommendations – Oral Notification of Meets

The Commission recommends that on all main line CTC controlled territory dispatchers provide oral notification of train meets wherever possible by advising head-end crews where the meet is anticipated to occur. The Commission also recommends that it be mandatory for dispatchers to advise head-end crews of every meet involving a passenger train.

J. Passenger Safety

The fact that the collision took the lives of 19 people who were riding in the passenger coaches of Train 4 and resulted in serious injury to many others, raised concern as to the adequacy of the safety features of the passenger equipment. The evidence suggests that deficiencies which exist in the equipment did not aggravate the situation on February 8. The casualties would in all probability been the same had those deficiencies not existed.

However the Commission considers it prudent to comment on several issues which relate to passenger safety.

1. Marshalling of Train 4

As was previously described, Train 4 from Vancouver and Train 6 from Prince Rupert had been joined together in Jasper. The entire consists of Train 6 had been joined to the end of Train 4. The locomotive of Train 6 therefore travelled in the middle of the combined train and its pulling power was not used.

In the Commission proceedings, the concern was raised that the position of the heavy locomotive in the middle of the train might have aggravated the damage to the passenger cars marshalled ahead of it. The reasons for joining the trains together in Jasper and having them continue on to Edmonton together is purely economic. The cost of moving the two trains to Edmonton independently exceeds the cost of operating the two trains together from Jasper to Edmonton.

One of the provisions of CN Rail General Operating Instructions bears on this practice. Rule 6.6(e) states:

> Dead or Idling Units
>
> Dead or idling units should be handled immediately behind the engine assigned to the train. Where special circumstances require, they may be placed at the most convenient location in the train.

The Commission was advised that the economic considerations render the situation special as far as CN's operations management was concerned.

The Commission was also advised that CN had inquired of the RTC whether the practice violated any regulation and had been advised that it did not. The RTC would not say that it approved of the practice but neither did it think it created any safety hazard.

The Commission obtained the services of an independent assessor to advise whether or not the positioning of the locomotive in the middle of the passenger consist made any difference to the impact forces exerted upon the passenger cars marshalled ahead of the mid-train locomotive or the passengers riding in those cars. The advise was unequivocal that the forces would not be significantly affected.

The Commission is satisfied that the marshalling of the locomotive in the middle of the train did not have any hazardous consequences.

2. Emergency Exits

The passenger cars used on Train 4 had exits at each end. There were, however, no emergency break-out windows to facilitate escape should the end doors be unusable or inaccessible.

The Commission was given to understand that VIA Rail intends to retire its existing passenger equipment and procure modern equipment which will have emergency exit windows. If it is able to pursue this policy, it should not be necessary to require VIA Rail to retrofit its existing equipment. However, should VIA Rail continue to use its existing passenger cars for any significant time, it should institute a program of installing emergency exit windows during refurbishings or maintenance of that equipment.

The Commission was also advised that there is no ready means by which passengers can inform themselves as to the location of emergency exits or of emergency equipment. Apparently after the collision, some passengers were confused as to the location and type of emergency exits and as to the availability and location of first aid and fire fighting equipment.

3. Recommendations – Emergency Exits

The Commission recommends that VIA Rail be required to install emergency break-out windows in any of its existing passenger equipment which it plans to retain in service for a period of three or more years. It is recommended that the RTC establish regulations setting out the minimum standards required for such emergency exit windows. It is further recommended that the position of all emergency exits be clearly marked and that VIA Rail install on every passenger car placards describing the location of emergency exits and of emergency equipment. Onboard passenger service crews should be instructed to draw the attention of the passengers to these notices.

4. Emergency Equipment

The emergency response equipment available on the train was criticized by two passengers. There were fire extinguishers on the train but they were designed only to combat small fires. While larger fire extinguishers might have provided some momentary additional assistance, the Commission is of the view that it is not practical to expect passenger trains to be equipped with fire fighting equipment of such a standard as would have been effective to combat an inferno such as occurred at Dalehurst on February 8. However it is noted that the CTC in its report following the Trudel investigation commented on this same fire fighting equipment and recommended that:

> . . . VIA ensure that the existing fire extinguishers are of adequate capacity and reliability and that employees are properly instructed in their use.
>
> *The Trudel Collision*, p.7

The Commission endorses this recommendation. It also recommends that the CTC review the adequacy of its regulations concerning the standards for fire extinguishers.

5. First Aid Training

Prior to February 8, first aid instruction was provided to VIA's on-board service personnel on a voluntary basis. After the collision, and following a review of their procedures, VIA Rail advised the Commission that it intended to implement a new policy by which all presently untrained personnel and all new personnel would be required to receive first aid training. The policy would also include a retraining program for employees who have not recently participated in first aid courses. VIA Rail advised as well that the training would include the subject of emergency evacuation of passenger cars in a major disaster such as the Hinton collision.

The Commission wishes to note that the actions of the VIA crew in assisting passengers from the wreckage following the collision and attending to injured passengers was praised by several witnesses. Those crew members who were able to do so assisted admirably. Nevertheless, the Commission is of the view, as apparently is VIA Rail itself, that the standard of first aid training is in need of improvement and considers VIA's announced intentions an appropriate step in that direction. The Commission is of the view that the refresher first aid courses should be compulsory and required at regular intervals.

K. Emergency Response

It is beyond the terms of reference of this Commission to consider the performance of the various agencies responding to the disaster and providing emergency assistance to the victims. However, the information presented to the Commission establishes clearly that the quality of that emergency reaction was extremely high. Most of the assistance came from the citizens of Hinton and vicinity who were well prepared to deal with a disaster of this nature. Local organizations, businesses and provincial agencies which had fire fighting and other emergency response equipment and facilities responded efficiently and effectively. Efforts of those who responded to those in need of medical attention were particularly efficient. The state of readiness of the local community and the cooperation extended by citizens, local businesses and industries, neighbouring communities and government agencies is deserving of local pride and national recognition.

III. LIST OF CONCLUSIONS

Time and Location of Collision:

1. That Train 413 and Train 4 collided at Mile 173.13 on the Edson – Jasper CN Main Line at 0840:52 on Saturday, February 8, 1986.

Collision Events:

2. That there was no brake application on either train prior to the collision.

3. That the trains were within sight range of each other for about 19 seconds preceding the collision.

4. That Train 413 had proceeded past an approach signal located about 3 miles east of the collision site which had instructed the engineer to slow to 30 m.p.h. and to be prepared to stop at the next signal. The engineer did not obey this instruction.

5. That Train 413 proceeded past the "home signal" located approximately 1850 feet east of the collision site, which was displaying an instruction for the engineer to stop the train.

6. That Train 413 ran through the switch which was located 1270 feet east of the collision site and which was lined against Train 413 and in favour of the eastbound Train 4.

7. That Train 413 was travelling at approximately 59 m.p.h. at the time of impact and had exceeded maximum track speed, 50 m.p.h., from about Mile 168 to the point of impact.

8. That the signals governing the movement of Train 4 authorized it to proceed on the track on which the collision occurred. The Dalehurst home signal for Train 4 turned red some 18 seconds prior to the collision.

9. That the speed of Train 4 at the time of impact was probably about 58 m.p.h. but was clearly not less than 49 m.p.h.

Analysis:

Track:

10. That nothing relating to the track design, structure, or integrity contributed to the collision.

Trains:

11. That there was nothing in the maintenance record of the equipment which made up either train that was of significance to the collision events.

12. That the predispatch preparations of the train equipment in Edmonton, Vancouver and Prince Rupert were satisfactorily performed, although the record keeping procedures used by the Edmonton crew were deficient. The trains were in proper running condition when they left their respective points of origin.

13. That 2 separate minor operational incidents, one relating to an excitation light and the other to the locomotive lurching at low speeds, which occurred in the Edmonton to Edson run of Train 413 were not of significance to the collision events.

14. That other than a problem with the locomotive radio of Train 4, there were no significant operational deficiencies experienced with either section of that train prior to their arrival in Jasper.

Brakes:

15. That the absence of any brake application on either train prior to the collision was not the result of a malfunction in the braking system of either train.

Radios:

16. That notwithstanding inadequacies in the maintenance records, it is possible to conclude that the locomotive radio of Train 413 was working properly at the time of the collision.

17. That at all relevant times Conductor Smith's grey radio and the caboose red radio on Train 413 were working properly.

18. That although intermittent problems experienced with the locomotive radio of Train 4 prior to arrival in Jasper make a definite conclusion as to the condition of that radio impossible, the fact that the radio was working in Jasper and in Hinton renders it likely that the radio was working properly at the time of the collision.

19. That there were no features of the Dalehurst topography which created any "dead spots" which could have affected radio communication on February 8.

20. That the unusually severe geomagnetic activity which occurred on February 8 would not have affected radio transmissions at Dalehurst.

21. That no deficiency in the radio communication system was among the factors which contributed to the collision.

Signals:

22. That the signals which governed the 2 trains immediately prior to the collision had been properly and regularly maintained since their installation.

23. That the signals operated as designed and nothing in the design was inadequate insofar as the events of February 8 at Dalehurst are concerned.

24. That there was no hindrance to the visibility of the signals to the engineers of either train.

25. That while geomagnetic activity was present, it had no relevance to the operation of the signals or for that matter to the accident.

Alcohol or Drugs:

26. That none of the members of the crews in control of either train were under the influence of alcohol or drugs at the time of the collision.

Position of Hudson's Remains:

27. That notwithstanding suggestions to the contrary, the evidence does not support the conclusion that Hudson was anywhere other than in the locomotive engineer's seat at the time of the collision.

Actions of Crew of Train 4:

28. That there was no action that could have been taken by the head-end crew of Train 4 which could have avoided the collision. None of the actions or omissions of that crew contributed materially to the collision.

Alertness of Crew Members:

29. None of the members of the crew of Train 413 had adequate rest prior to setting off for Jasper on the morning of February 8. Their condition was such that the failure of any one of them to retain or exert control over the train may have resulted from inattentiveness owing to fatigue.

Hudson's Medical Condition:

30. That the serious nature of Hudson's medical condition in 1985 raises a strong possibility that it was a factor contributing to the collision of February 8. Close analysis of the evidence does not permit confirmation or elimination of that possibility.

31. That there were serious deficiencies in the manner in which CN monitored and reacted to Hudson's medical condition. The policies and procedures which permitted a man in Hudson's medical state to be responsible for the operation of a freight train on CN main lines are unacceptable.

Hudson's Personal Life:

32. That the personal situation of Engineer Hudson aggravated the other stresses and conditions which might have contributed to the collision but his failure to take action to avoid the collision was not deliberate.

Regulation of Operations:

33. That notwithstanding that they say they recognize the fundamental importance of the Rules which govern train movements, the conduct of both railway management and railway employees betrays the fact that they do not hold sufficient respect for the Rules.

34. That the application of CN's policies and procedures relating to supervision and discipline in the case of Engineer Hudson shows them to be inadequate.

35. That given Hudson's discipline record and alcoholism, his performance should have been kept under close watch. It was not.

Safety Control Appliances:

36. That though there was no direct evidence on the subject available, the fact that there was no brake application on either train and that the deadman's pedal is routinely blocked out raises a reasonable possibility that the deadman's pedal on one or both trains had been rendered inoperative prior to the collision.

37. That if the lead locomotive of Train 413 had been equipped with a reset safety control, there is a strong possibility that the collision would not have occurred.

Rule 3.2(b):

38. That even by Smith's own understanding of the requirements of Rule 3.2(b) he did not comply with it in that when he had exhausted all means of communicating with the head-end of his train, and there was no response to the radio calls he made, he did not pull the emergency cord.

39. That had Smith complied with the Rule, the train would likely have been stopped in sufficient time to prevent the collision.

40. That the amendment to Rule 3.2(b) which CN management effected in July, 1985 brought about a significant reduction in the quality of that Rule as an assurance of appropriate engineer response to signals.

Oral Notification of Meets:

41. That if there had been a procedure whereby dispatchers give oral notification of upcoming meets to engineers, there is a possibility the collision would not have occurred.

Marshalling of Train 4:

42. That the marshalling of a locomotive in the middle of Train 4 did not have any hazardous consequences.

43. That any deficiencies which may exist in the safety features of the passenger equipment of Train 4 did not aggravate the consequences of the collision.

IV. LIST OF RECOMMENDATIONS

Rest:

1. That the government take immediate steps to regulate the hours of work of running crew employees so as to ensure that acceptable levels of vigilance are likely to be maintained for the entire duration of each train movement.

2. That this be accomplished through a mandatory period of off-duty time which until appropriate regulations can be formulated, should be no less than 10 consecutive hours in each 24 hour period with an additional 48 consecutive hours in each period of 168 hours. This interim measure is to be superimposed on the existing system by which crew members may book rest when they consider they need it.

3. That the determination of the form of regulation which will replace the interim provision be completed within 18 months.

Work Scheduling:

4. That the railways be required to alter the system of freight crew work assignments as necessary to:

   a) permit crew members to be advised at least 7 days in advance of the approximate times at which they will be required to work.

   b) assign crews in such a way that their work is performed at roughly the same time of day, each day they are on duty.

   c) coordinate the operations of trains moving in opposite directions on the same routes, so that layovers in the away-from-home terminals do not exceed approximately 3 hours.

Working Conditions:

5. That railways immediately institute improvements in conditions on existing locomotives by implementing the recommendations of the 1984 CTC Report on Cab Conditions as to noise, temperature, vibration, seating, toilet facilities and hand washing facilities.

6. That the railways give attention to ergonomic principles in effecting design and specification improvements in all new or refurbished locomotive cabs.

Medical Supervision:

7. That CN be required to audit the procedures and policies of its medical office regarding the assessment, monitoring and maintenance of the health of running crew employees with a view to identifying specific deficiencies and developing policies and procedures which are effective to ensure that the medical condition of its operating personnel is consistent with the highest safety standards.

8. That a legislative provision be enacted similar to Section 5.5 of the *Aeronautics Act*, requiring physicians who discover that a running crew employee has a medical condition likely to constitute a hazard to rail safety, to inform the railway medical officer of his opinion and reasons therefore.

9. That CN take steps to establish effective coordination of the functions of its medical officers and operational officers.

10. That the CTC review its regulations concerning medical fitness with a view to including standards with respect to matters of physical health in addition to vision and hearing acuity and that regulations establishing such standards be promulgated as soon as possible.

Employee Assistance Program:

11. That the structure of CN's Employee Assistance Program be reviewed and improved to ensure that it provides effective monitoring of, and continuing support for employees participating in it as long as is necessary, and that it is designed so that an employee whose problem persists notwithstanding participation in the program, is not assigned to duty.

12. That CN take whatever steps may be necessary to ensure that management officers do not consider or treat the Employee Assistance Program as a substitute for normal management function.

CN's Supervision and Discipline:

13. That CN re-evaluate its policies and procedures with respect to supervision and discipline and introduce such changes as are necessary to establish an effective means of ensuring that running crews carry out their duties in strict compliance with the rules.

14. That CN instruct its supervisory personnel to give rule compliance and monitoring a high priority and that it take steps to ensure that the supervisory activities of its operations managers convey to running crew employees that such a priority has been established.

15. That CN adopt effective monitoring techniques, in particular, a system of created efficiency tests of a type employed by CP Rail in addition to intensifying rule monitoring of the type presently used.

16. That CN alter the fraternal approach it takes to supervision and discipline.

17. That CN review its policies with respect to the recording of discipline and ensure that every detected breach of the rules is recorded.

18. That CN adopt a policy of determining the number of demerit points awarded in any particular case on the basis of the employee's entire disciplinary record.

19. That CN establish a policy of increased supervision and monitoring of the operations of any crew member whose total demerit points exceeds 40.

20. That the CTC take whatever steps are necessary to determine whether or not CN alters and improves its policies and procedures in this regard and to bring about this result if CN does not do so on its own.

Government Involvement in Regulation of Operations:

21. That the government take immediate steps to make the Uniform Code of Operating Rules current and to maintain it in that condition.

22. That the regulatory system be restructured so that the rule making function is not assigned to the same agency as the supervision, enforcement and investigation functions.

23. That the agency charged with supervision, enforcement and investigation be given adequate manpower for the effective fulfillment of its function.

24. That the agency charged with enforcement of the rules adopt a policy of prosecution of railways and individuals who are in breach of the rules and that any legislative amendments necessary to permit the effective adoption of such a policy be given high priority.

25. That a procedure be adopted similar to that established by Sections 6.6 to 7.2 of the *Aeronautics Act* by which the Minister of Transport may assess penalties for certain designated offences using a summary procedure which includes a right of appeal. This would be in addition to conventional prosecutions.

Safety Control Appliances:

26. That CN Rail continue with the full implementation of its program to install reset safety control appliances in locomotives so that by January 1, 1988 all lead locomotives will be equipped with this device and, that in the interim CN adopt a policy by which the first criterion for determining which locomotive will be in the lead position is the presence of a reset safety control device.

27. That all VIA Rail locomotives be equipped with reset safety control devices by January 1, 1988 and that all new locomotives purchased by VIA Rail be equipped with reset safety controls.

28. That CP Rail embark on a program of installing RSC appliances in its locomotives similar to that which has been undertaken by CN according to a time table to be approved by the RTC.

29. That the RTC amend its regulations to provide that the deadman's pedal or other similar device does not constitute compliance with the regulation.

30. That the RTC take such steps as are necessary to ensure that any employee who renders any safety control appliance inoperative is prosecuted and that the railways dismiss such an employee.

31. That the RTC adopt a policy of immediately bringing to the attention of the highest level of railway management any information concerning interference with safety control appliances and that any railway tolerating such interference be prosecuted.

32. That such amendment of legislation as is necessary to make prosecutions of this type effective be passed as soon as possible. Penalties for rendering any safety control appliance inoperative should be severe.

Remote Mechanical Intervention – ATCS:

33. That the RTC or such other agency as may be assigned to monitor the development of ATCS, establish, in conjunction with the railways, a critical path schedule, whereby the remote intervention and enforcement aspects of Level 30 of ATCS will be in place on all CTC controlled main line tracks in Canada by the end of 1989.

34. That as soon as possible after 1989 at least the remote enforcement aspects of ATCS be implemented on secondary and branch lines.

35. That if the railways do not commit to a cooperative and voluntary schedule of implementation of the remote intervention and enforcement aspects of Level 30 of ATCS, or in the event any cooperative and voluntary commitment entered into is not complied with, then a hearing be ordered forthwith whereat the railways be required to show cause why an effective form of remote intervention and control to enforce speed and authority limits cannot be implemented immediately.

Rule 3.2(b):

36. That CN amend the Rule 3.2(b) to ensure that it cannot be interpreted as permitting the conductor any discretion as to whether he should apply the emergency brake if he does not receive a response to a call initiated in compliance with the Rule.

37. That the words "when practicable" be completely removed from the Rule.

38. That CN take such steps as are necessary to ensure that all crew members are aware that the Rule does not provide to them any discretion whatsoever.

Oral Notification of Meets:

39. That on all main line CTC controlled territory dispatchers provide oral notification of train meets wherever possible by advising head-end crews where the meet is anticipated to occur.

40. That it be mandatory for dispatchers to advise head-end crews of every meet involving a passenger train.

Passenger Safety:

41. That VIA Rail be required to install emergency breakout windows in any of its existing passenger equipment which it plans to retain in service for a period of three or more years.

42. That the RTC establish regulations setting the minimum standards required for emergency exit windows in passenger equipment.

43. That VIA Rail be required to clearly mark each emergency exit in its passenger equipment, install by every door of every passenger car a placard describing the location of emergency exits and emergency equipment, and instruct its onboard service personnel to draw the attention of passengers to these notices.

44. That VIA Rail ensure that the existing fire extinguishers on passenger cars are of adequate capacity and reliability, and that employees are properly instructed in their use.

45. That the CTC review the adequacy of its regulations concerning the standards for fire extinguishers.

ACKNOWLEDGEMENTS

Our work on this Inquiry is now completed. It has been a long and arduous task but in many ways enlightening and gratifying. It will have all been worthwhile if some significant positive action is taken as a result of the efforts of this Commission of Inquiry. This opportunity to increase safety on Canadian Railways comes as a result of the terrible tragedy of February 8th, 1986. It must not be wasted.

To even begin to accomplish the work of the Commission, the help and cooperation of a large number of people was required. While I cannot commence to list them all, nonetheless each and every one has my sincere appreciation.

I want to thank all counsel for the participants. Each of them cooperated fully with us. They willingly assisted in exploring issues suggested to them by the Commission and did not hesitate in bringing forth issues of their own. Because most of the burden of producing massive amounts of information and documents fell on CN Rail, I am particularly indebted to counsel for CN for assisting the Commission promptly and generously.

I also want to express my gratitude to the participants whose officers and employees often had to burn the midnight oil in order to provide their counsel with required data. In particular, I want to single out CN's Eric Kearny and his staff who found miraculous ways of obtaining and providing the mountains of material requested by the Commission.

It is perhaps trite but true to say that without our staff the task at hand would have been impossible. Thanks and kudos to:

- our receptionists and stenographers, Barbara Grant, Lorraine Hill, Colette Jobin, Andrea Rochat and Trincy Buwalda. A special thanks to Liz Hughes, on loan from the law firm McLennan Ross of Edmonton. She did an enormous amount of work, always to perfection and always cheerfully.
- William (Bill) Lewis, a former Court of Queen's Bench Trial Coordinator, who willing came out of retirement to act as our Registrar. He added dignity to the proceedings, marshalled and guarded hundreds of exhibits and single-handedly prevented anyone from entering the Hearing Room with a coffee cup in hand.
- our Executive Director, Jim Hughes, for his attention to detail and administrative procedures.
- Don Leitch and Doug Scott who greatly assisted in the preparation of the Report.
- Our Commission expert, Brian Longson, for providing the Commission with up-to-date and timely advice and opinions on railway technology.
- Cur Court Reporters, Kevin Moore, Susan Stelter, Ann Baker and Marion Moore, for displaying industry and accuracy, often during extra long days of hearings, and to their employer, Gary Moore, who organized the reporting system and provided us with a computer system second to none.
- our less senior counsel, Graham McLennan, Gerhard Seifner and Chris Rogers whose accurate legal opinions greatly assisted the Commission in resolving tricky problems.
- François Patenaude, who undertook, on very short notice, to correct and edit the French version of the report. The fluent very readable style is a credit to his ability.
- Flavius Anctil, who ably ensured a correct translation of the technical expressions of the railway language.

Lastly, my sincere expression of gratitude to Commission Counsel, Roderick A. McLennan, Q.C. and Brian Burrows. A Commissioner does not begin to appreciate how hopeless his task would be until he contemplates trying to function without counsel such as Mr. McLennan and Mr. Burrows. They have been inquisitive and ingenious; they have been forceful and, when required, kind and compassionate; they have been tireless at finding, sorting, organizing and presenting material to the Commission. In short, they have epitomized the word "professional".

APPENDICES

1. Orders in Council
2. List of Witnesses
3. Extract from CN Mountain Region Timetable
4. Shifts Worked by Engineman Hudson
5. Extracts from CN Rail Collective Agreements
6. List of Participants

APPENDIX I

P.C. 1986-382

CANADA

PRIVY COUNCIL

Certified to be a true copy of a Minute of a Meeting of the Committee of the Privy Council, approved by Her Excellency the Governor General on the 10th day of February, 1986.

The Committee of the Privy Council, on the recommendation of the Minister of Transport, advise that a Commission do issue under Part 1 of the Inquiries Act to appoint Mr. Justice René Paul Foisy of Edmonton to be a Commissioner to inquire into and report on the collision of Via Rail Canada Inc. train number 4 and Canadian National Railway train number 413 at or about mile 173, Edson Subdivision in the province of Alberta on February 8th, 1986, and more particularly without limiting the generality of the foregoing, to inquire into and report on:

1. the factors contributing to, causes of and circumstances connected with this collision;

2. the adequacy of existing federal law, regulations, rules and standards governing railway operations and safety, insofar as they relate to this collision;

3. the adequacy of existing practices, procedures and standards governing railway operations and safety followed by Canadian National Railways and Via Rail Canada Inc., insofar as they relate to this collision;

4. the performance of all persons and mechanical components involved in the operation of the trains involved in this collision and the traffic control systems governing their movements;

5. the steps which can be reasonably taken to reduce the risk of recurrence of such a collision anywhere in Canada; and

6. any matters incidental or relating to any of the matters referred to in paragraphs 1 to 5.

And do further advise:

a) that the Commissioner be authorized to adopt such procedures and methods as he may consider expedient for the proper conduct of the inquiry including the holding of public hearings;

b) that the Commissioner be authorized to engage the services of such staff, experts and other persons and counsel as he may consider necessary or advisable at such rates of remuneration and reimbursement as may be approved by the Treasury Board;

c) that the Commissioner be directed;

(i) to submit a full report, in both official languages, to the Governor in Council by May 30th, 1986; and

(ii) to file his papers and records as soon as may be reasonable after the conclusion of the inquiry with the Clerk of the Privy Council; and

d) that pursuant to section 37 of the Judges Act, Mr. Justice René Paul Foisy be authorized to act as Commissioner in the inquiry.

Certified to
be a true copy,

Assistant Clerk of
the Privy Council.

P. C. 1986-1578

Certified to be a true copy of a Minute of a Meeting of the Committee of the

Privy Council, approved by Her Excellency the Governor General

on the 26th day of June, 1986

The Committee of the Privy Council, on the recommendation of the Prime Minister and the Minister of Transport, advise that a commission do issue amending the Commission issued pursuant to Order in Council P.C. 1986-382 of 10th February, 1986, as follows:

(a) by deleting therefrom the following paragraph:

"(iii) to submit a full report, in both official languages, to the Governor General in Council on or before May 30th, 1986; and"

and substituting therefor the following:

"(iii) to submit a full report, in both official languages, to the Governor General in Council on or before December 31, 1986; and"

(b) by adding after paragraph (iv) the following:

"AND WE DO HEREBY direct that Our Commissioner be known as the "Commission of Inquiry into the Hinton Train Collission"."

CERTIFIED TO BE A TRUE COPY — COPIE CERTIFIEE CONFORME

CLERK OF THE PRIVY COUNCIL — LE GREFFIER DU CONSEIL PRIVE

APPENDIX 2

COMMISSION OF INQUIRY

HINTON TRAIN COLLISION

LIST OF WITNESSES
(in order of appearance)

	WITNESS	CAPACITY
1.	Ross Allan WALKER	Senior Vice-President, Western Canada — CN Rail
2.	Gerald H. SPENSE	Assistant Chief Engineer of Signals & Communications — CN Rail
3.	Jeffrey P. KEOGAN	Frontend Trainman, Jasper — CN Rail
4.	Joseph V. HEBERT	Manager, Communication Systems, Montreal — CN Rail
5.	William R. HARMON	Chief Train Dispatcher, Edmonton — CN Rail
6.	John T. MCBAIN	Regional Chief Engineer, Mountain Region — CN Rail
7.	Ronald William CAPPER	General Superintendent of Equipment, Mountain Region — CN Rail
8.	Philip F. STEPHANSON	Rules & Training Coordinator, Edmonton — CN Rail
9.	Meredith Glynn LYONS	Senior Transportation Officer, Prairie Region — CN Rail
10.	Ronald G. ANDERSON	General Superintendent of Transportation, Mountain Region — CN Rail
11.	Joseph KOLODRUBSKY	Regional Accident Investigating Officer, Alberta Region — CTC
12.	Wayne Rodney SMITH	Conductor, Train 413 — CN Rail
13.	Herbert Raymond TIMPE	Assistant Conductor, Train 4 — CN Rail
14.	Nelson Cooper QUAST	Crew Member, Train 4 — CN Rail
15.	Michael Robert JANUSZ	Locomotive Engineer, Train 413 — CN Rail
16.	Kenneth Guy CUTTLE	Passenger, Train 4
17.	Donald Allan OZUBKO	Engine Service Brakeman, Edmonton — CN Rail
18.	Steven Brent MORLEY	Rearend Trainman, Train 413 — CN Rail
19.	Nicholas OSTAFICHUK	Conductor, Train 413 — CN Rail
20.	John William RAISTRICK	Passenger, Train 4; Trainman, Edmonton — CN Rail
21.	Edith Louise RAISTRICK	Passenger, Train 4
22.	Walter ZAVADUK	Dispatcher, Edmonton — CN Rail
23.	Brian James STROUD	Yard Movement Clerk, Edson — CN Rail
24.	Richard Brian MOSS	Operator, Edson — CN Rail

25.	Brian William NESBITT	Locomotive Engineer, Jasper — CN Rail
26.	Melvin Samuel EDGE	Conductor, Jasper — CN Rail
27.	John Moffat MCMURRAY	Conductor, Jasper — CN Rail
28.	Brian Barry FIEBER	Conductor, Jasper — CN Rail
29.	Ron JOHNSON	Locomotive Engineer, Jasper — CN Rail
30.	Lawrence Joseph CAREY	Frontend Trainman, Jasper — CN Rail
31.	Gordon Stanley BARTUSEK	Conductor, Jasper — CN Rail
32.	Geoffrey Charles PRETTY, M.D.	Regional Medical Officer, Edmonton — CN Rail
33.	Kiong Soon CHEE	Motive Power Supervisor, Calder Shop, Edmonton — CN Rail
34.	James Edward HEYD	Passenger, Train 4
35.	Jeffrey Michael SIMPSON	Passenger, Train 4
36.	Bruno BELANGER	Passenger, Train 4
37.	Benito Angelo LEGGIO	Conductor, Edmonton — CN Rail
38.	David Thomas CLARKE	Locomotive Engineer, Edmonton — CN Rail
39.	Mike GROSH	Passenger, Train 4
40.	Hank GULDIE	Passenger, Train 4
41.	Randolph Michael MCINROY	Passenger, Train 4
42.	Dale KEDDY	Passenger, Train 4
43.	Perry Kenneth WARNISKI	Passenger, Train 4
44.	Gregory Michael PARANICH	Passenger, Train 4
45.	Sheldon Frederick MANG	Machinist, Dispatch Crew Team, Calder Yard, Edmonton — CN Rail
46.	Wilfred L. SAWYER	Outside Supply Man, Dispatch Crew Team, Calder Yard, Edmonton — CN Rail
47.	Leander Keith LANE	Lead Hand, Dispatch Crew Team, Calder Yard, Edmonton — CN Rail
48.	Brian Allan ROBERTSON	Carman, Calder Yard, Edmonton — CN Rail
49.	Steven Brian PETTIFER	Carman, Calder Yard, Edmonton — CN Rail
50.	Brian William JOHNSON, M.D.	Surgeon — Royal Alexandra Hospital
51.	Phillip James MACDONALD	General Manager, Western Canada — CN Rail
52.	Walter Murray COSMAN	Assistant General Superintendent, Car Equipment, Mountain Region — CN Rail
53.	John W. STAPLES	Mechanical Assistant, Motive Power, Edmonton — CN Rail
54.	John BUBA	Mechanical Officer, Car Department, Edmonton — CN Rail
55.	Michael E. ZENERT	Mechanical Assistant, Edmonton — CN Rail
56.	Arnold Charles YOUNG	Manager, Mobile Radio Facilities — CN Rail
57.	Derrick J. POUNDER	Deputy Chief Medical Examiner, Northern Alberta
58.	Robert H. D. COLQUHOUN	Coordinator, Employee Assistance, Mountain Region — CN Rail
59.	George GYSEL	Manager, Employee Relation Services, Mountain Region — CN Rail
60.	Herbert H. DOFKA	Engineer of Signals & Communications, Mountain Region — CN Rail

61.	Roy A. RUDYK	Signal Supervisor, Mountain Region — CN Rail
62.	Brian G. WILLIAMS	General Supervisor of Signal Inspection, Mountain Region — CN Rail
63.	William B. THOMPSON	Signal Supervisor, Mountain Region — CN Rail
64.	Robert W. RADFORD	Chief Mechanical & Electrical Engineer, Montreal — CN Rail
65.	James F. R. GUSSOW	System Transportation Engineer, Montreal — CN Rail
66.	Gordon Harold GRAHAM	Regional Officer, Operation Safety, Alberta Region — RTC
67.	Raymond Garis AMBLER	Corporal, Edmonton General Investigation Section — RCMP
68.	Raymond J. L. MUNRO	Sergeant, Edmonton General Investigation Section — RCMP
69.	Robert Joseph CROTEAU	Conductor — CN Rail; Chairman, Conductor's Lodge 1233 — UTU
70.	Robert Lee WALLACE	Trainman — CN Rail; Chairman, Trainman's Lodge 1233 — UTU
71.	Robert James GUINEY	Vice-President — VIA Rail
72.	John Blackburn HOWARTH	Locomotive Engineer — CN Rail; Member, Local 843, Prince George — BLE
73.	David Hugh BOWMAN	Senior Engineer, Kenonic Controls Ltd.
74.	Eugene Russell KOWCH	Senior Engineer, Kenonic Controls Ltd.
75.	Jerrold J. TUCKER	Locomotive Engineer — CN Rail; President — BLE, Biggar
76.	Julius LUKASIEWICZ	Aeronautical Engineer; Professor — Carleton University, Ottawa
77.	Dennis Grant BANK	Constable, Hinton Detachment — RCMP
78.	Gordon John Daniel RENNICK	Constable, Hinton Detachment — RCMP
79.	Stephen WORT	Assistant General Yardmaster, Jasper — CN Rail
80.	Cecile Loretta Mary F. BOYNE	Crew Dispatcher, Jasper Crew Office — CN Rail
81.	John Alexander KOSS	Conductor, Jasper — CN Rail
82.	Robert Kent PEET	Train Movement Clerk, Edson Station — CN Rail
83.	David Arthur WHARTON	Assistant Crew Director, Jasper Crew Office — CN Rail
84.	Roy P. WILKINSON, M.D.	Physician — Jasper Medical Group
85.	Douglas Ross IRELAND	Assistant Car Foreman, Jasper Car Department — CN Rail
86.	Laurence Kenneth SEMENICK	Car Inspector, Jasper Car Department — CN Rail
87.	James BANGLE	Assistant General Yardmaster, Jasper — CN Rail
88.	Murdock BOWEN	Shop Foreman, Jasper — CN Rail
89.	Rodney J. KENNEDY	Locomotive Engineer, Jasper — CN Rail
90.	Gordon H. MIDDLETON	Locomotive Engineer, Jasper — CN Rail
91.	Calvin ELLIOTT	Locomotive Engineer, Jasper — CN Rail
92.	Martin DELANEY	Roadmaster, Hinton — CN Rail
93.	Gary Herbert GORDON	Master Mechanic, Jasper — CN Rail

94.	Lyle Harvie UMPHERVILLE	Trainmaster, Edson — CN Rail
95.	Kenneth Lloyd HAMMELL	Trainmaster, Jasper — CN Rail
96.	Paul G. H. HOPKINS	Master Mechanic, Jasper — CN Rail
97.	George DOWNEY	Trainmaster, Jasper — CN Rail
98.	William L. RUSSELL	Locomotive Engineer, Jasper — CN Rail
99.	Brian SHERBAN	Engine Watchman, Jasper — CN Rail
100.	Roy Lawrence PETERSON	Locomotive Engineer, Jasper — CN Rail
101.	Warren Bradley BROWN	Conductor, Jasper — CN Rail; Local Chairman, Conductor's Lodge — UTU
102.	Myron William BECKER	Engine Service Brakeman, Jasper — CN Rail; Local Chairman, Trainman's Lodge — UTU
103.	Albert Joseph WAGNER	Assistant Superintendent, Jasper — CN Rail; Co-Chairman, Local Health & Safety Committee — BLE
104.	Harold KIDD	Signal Maintainer, Hinton — CN Rail
105.	Peter R. CALLEGARI, M.D.	Physician — formerly with Jasper Medical Group
106.	Jim GIFFORD	Locomotive Engineer, Jasper — CN Rail
107.	Patrick WERBICKI	Locomotive Engineer, Jasper — CN Rail
108.	Glen A. CAMPBELL	Locomotive Engineer, Jasper — CN Rail
109.	Terry JOHNSTON	Locomotive Engineer, Jasper — CN Rail
110.	George HAINSWORTH	Locomotive Engineer — CN Rail; Vice-Chairman, National Legislative Board — BLE
111.	Leo BERINI	Chairman, General Chairman's Association — BLE
112.	Robert LEGGETT	Locomotive Engineer, Jasper — CN Rail; Legislative Representative — BLE
113.	Glen WILSON	Engineer of Signals — South Pacific Railroad; Chairman, Signal Task Force — ATCS
114.	Keith Gordon MACDONALD	Manager, Labor Relations, Mountain Region — CN Rail
115.	Charles E. TAYLOR	Assistant Vice-President, Research & Test Department — AAR; Member, Steering Committee — ATCS
116.	Gary RUEGG	Director, ATCS — Union Pacific Railroad
117.	Gary PRUITT	Systems Engineer — ARINC Research
118.	Peter John DETMOLD	Executive Director, ATCS — RAC & AAR
119.	Ronald MCGRAW	Electrical Engineer; Division Director of Railroad Business — Rockwell International
120.	John F. WALTER	Chairman, Railway Transportation Committee — CTC
121.	William J. HARRIS	Past Vice-President, Research & Test Department — AAR; Prof., Transportation Engineering — Texas U & M University
122.	Lawrence H. OLSON	Conductor — CN Rail; Chairman, CN Lines West & Co-Chairman, Local 1233 — UTU
123.	James Michael HONE	Research Director, Canadian National Office — UTU
124.	Norris L. TOMLINSON	Supervisor, Edmonton — CN Police

125.	John WOISCHKE	Locomotive Engineer — Conrail-Penn Central Transportation Co.; Member, Operation Red Block Panel — BLE
126.	Darrell SORENSON	Director, Employee Assistance Program — Union Pacific System; Member, Operation Red Block Panel — BLE
127.	William WICK, Jr.	Manager, Employee Assistance Program — Chessie System Railroads; Member, Operation Red Block Panel — BLE
128.	Daniel W. COLLINS	Director of Education — UTU, Cleveland, Ohio; Member, Operation Red Block Panel — BLE
129.	Edward J. BRADLEY	Director of Rules, Dangerous Commodities Damage Prevention & Training, Montreal — CP Rail; Member, Operating Rules Comm. — AAR
130.	Robert COLOSIMO	Vice-President, Industrial Relations — CP Rail
131.	John J. MURRAY	Assistant Chief Mechanical Officer, Rolling Stock Maintenance, Montreal — CP Rail
132.	Darold J. GUDMUNDSON	Assistant Superintendent, Transportation, Prairie Region — CP Rail
133.	Jack M. WHITE	Assistant General Manager, Operation & Maintenance, Pacific Region — CP Rail
134.	Douglas L. FLETCHER	Senior Vice-President of Operations, Montreal — CN Rail
135.	Albert Milton BIRKETT	Consultant to the Commissioner regarding Rules
136.	Joseph W. LYSTER	Vice-President, Calgary — BLE
137.	Gordon ROSTOKER	Space Scientist, Specialty: Geomagnetic Fluctuations; Professor, Physics — U of A
138.	Peter Alexander NIBLOCK	Electrical Engineer, Specialty: Electronics & Communication Systems
139.	Harry R. J. HOME	Locomotive Engineer, Jasper — CN Rail; Vice-President, Division 898 — BLE
140.	Robert M. RENFREW	Executive Director — Canadian Institute of Guided Ground Transport
141.	Roger Matthew WILLIAMS	Retired Regional Operations Manager, Eastern Region — British Rail
142.	Brian H. LONGSON	Consultant to the Commissioner
143.	Alison SMILEY	Human Factors Engineer — Human Factors North
144.	Leslie BUCK	Psychologist, Ottawa; Member — Human Factors Assoc. of Canada
145.	Robert DEWAR	Psychologist, Calgary; Member — Human Factors Assoc. of Canada
146.	Leo MALOWANY, M.D.	Physician, Specialty: Internal Medicine — Links Assoc. Clinic
147.	Bruce HARVEY	Locomotive Eng., Vancouver — CN Rail & Pres., Div. 945 & Member, Health & Safety Committee — BLE

148.	John Mark ROBB	Locomotive Engineer, Vancouver — CN Rail; Past Local Vice-Chairman, Div. 945 & Alternate Member, Health & Safety Committee — BLE
149.	Joseph W. WALSH	Associate Administrator, Office of Safety — Federal Railroad Administration, Washington, D.C.
150.	Daniel M. PYSH	Manager, Labor Relations — British Columbia Railway

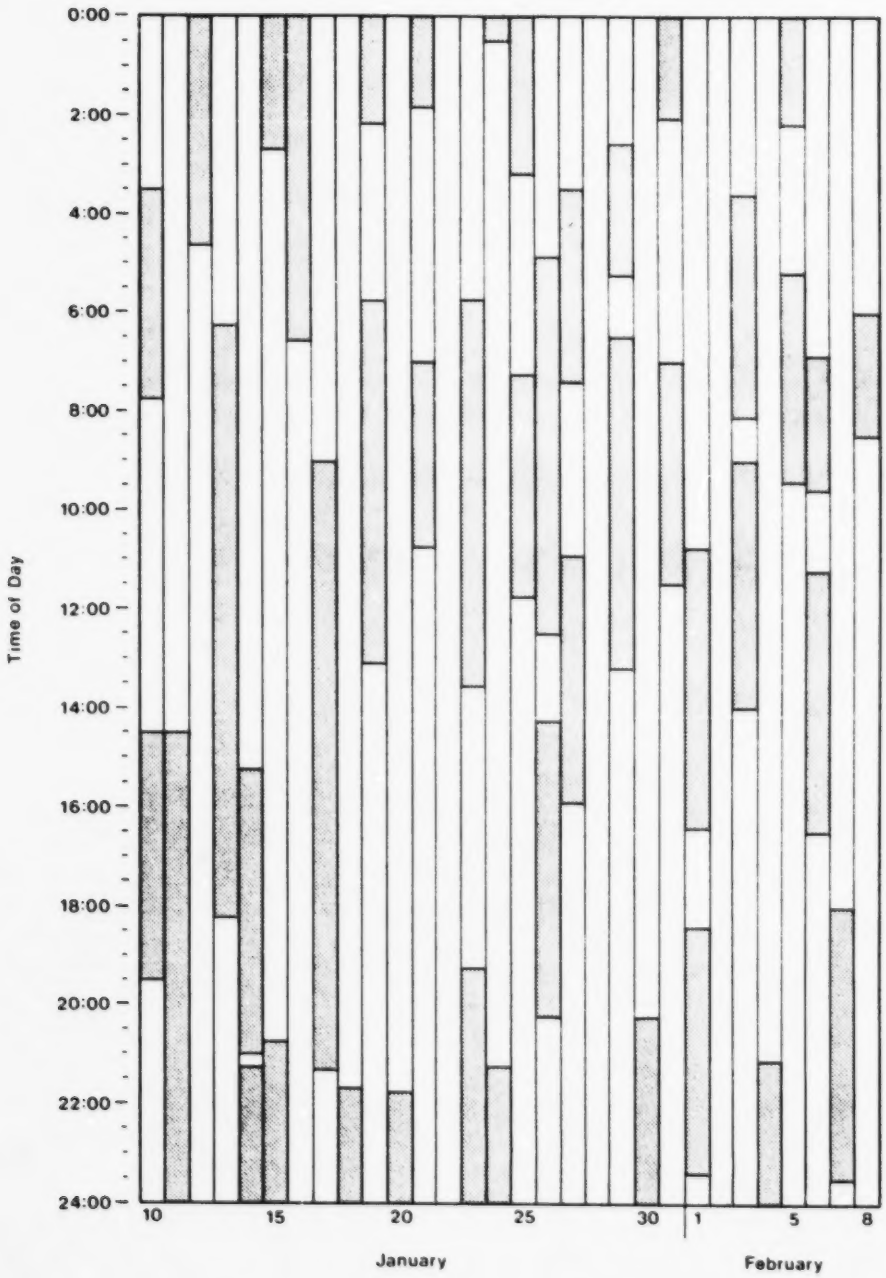
APPENDIX 3

WESTWARD TRAINS		Train Dispatcher Standby Channels and Tones	Opr Standby Channel	Mtce of Way Channel	Hot Box and Dragging Equipment Detectors	Miles from Edmonton	Yard Limits	EDSON SUBDIVISION		Office Signals	Siding Capacity in Feet	EASTWARD TRAINS
	FIRST CLASS							MOUNTAIN TIME				FIRST CLASS
	3											4
	Passenger											Passenger
	Daily							STATIONS				
1500						0 0	0 4	EDMONTON	CKWZ	MO		S1230
1510						4 2	4 2	WEST JCT	YZ			1210
				CH 82		4 9		DUNVEGAN JCT	X			
		CH 2 T 2				6 2		UNION JCT	X			
						8 1		BISSELL	X			
						14 9		SPRUCE GROVE				
1540					23 8	31 8		CARVEL				1130
		CH 2 T 1		CH 81	46 7	44 3		WABAMUN			5890	
						58 1		GAINFORD			6820	
						66 3		ENTWISTLE			6150	
S1620		CH 2 T 2		CH 82	70 0	68 1		EVANSBURG				S1050
						77 5		WILDWOOD			5630	
					92 3	88 1		LEAMAN			5850	
1650						99 7		NITON			6050	1015
						109 8		PEERS			6050	
		CH 2 T 1		CH 84	116 3	120 8		WOLF CREEK			5880	
						122 9		YATES				
						128 6		EDSON EAST	X			
S1740			1			129 6		EDSON	KWY	FY		0945 S0935
1750						130 1		EDSON WEST	X			
						135 7		BIG EDDY				
		CH 4 T 1		CH 81		137 9		BICKERDIKE EAST				
					143 2	140 1		BICKERDIKE WEST	X			
						150 2		GALLOWAY				
		CH 4 T 2				155 8		MEDICINE LODGE			6050	
						161 8		HARGWEN				
		CH 4 T 1		CH 82	166 5	173 0		DALEHURST				
						177 0		PEDLEY			6070	
S1900			4			184 6		HINTON			6120	S0820
						189 7		ENTRANCE			6100	
		CH 2 T 2			192 0	196 2		SOLOMON			5160	
						199 4		SWAN LANDING			7790	
						206 0		PARK GATE				
1950				CH 84	216 6	214 6		DEVONA	X			0730
						225 8		HENRY HOUSE				
		CH 2 T 1				232 0		ENGLISH	X			
						234 2		JASPER EAST				
S2030			3			235 7		JASPER	CKWY	GH		0705
		CTC between mileage 4 2 and Jasper Main track commences at mileage 0 4 Rule 105 applies between mileages 0 0 and 0 4										Daily
	3											4

EDSON SUBDIVISION FOOTNOTES ON PAGE 10

APPENDIX 4

SHIFTS WORKED
by
ENGINEMAN HUDSON
Period Jan. 10 to Feb. 8, 1986



LEGEND :

HOURS WORKED

APPENDIX 5

EXTRACTS FROM CN RAIL COLLECTIVE AGREEMENTS

Extract from:

AGREEMENT NO. 4.3

Between

CANADIAN NATIONAL RAILWAY COMPANY

And

UNITED TRANSPORTATION UNION

Governing

The Services of
Training and Yardmen
Prairie and Mountain Regions

Amended October 20, 1983

ARTICLE 35

Booking Rest At Terminals

35.1 Trainsman on arrival at terminals will not be called for immediate duty if he wants rest. Trainman will be judge of his own condition.

35.2 Required rest must be booked in whole hours on train register on arrival and will be given complete before being called except as provided in paragraph 35.8. Rest may be booked by telephone where men are released from duty at points other than where the train register is located.

35.3 At the home terminal a Trainman will not be permitted to book less than 3 Hours rest nor more than 24 hours rest.

35.4 At away-from-home terminals trainman will not be permitted to book less than 3 hours rest nor more than 8 hours rest. However, a trainman on a train performing "grain block work" in excess of 4 hours enroute will be permitted to book not more than 12 hours rest.

35.5 When a Trainman books rest of not more than 16 hours at the home terminal or not more than 8 hours at the away-from-home terminal, his crew will not be sent out until the rest period has expired.

35.6 When all members of a crew have rest booked in excess of the hours, they will not be called unless no other crew is available and there are insufficient sparemen to man a crew.

35.7 In the application of paragraphs 35.5 and 35.6, the rest period will commence from the time the last man is off duty, if the expiry time of his rest booked exceeds the rest booked by other members of the crew.

35.8 When traffic would be delayed through a shortage of trainmen, a trainman will be required to leave his home terminal after 10 hours rest.

35.9 Rest booked to be exclusive of call time

35.10 The provisions of paragraph 35.1 to 35.9 inclusive will apply to a man on a Joint Spare board upon completion of a tour of duty in road service.

On The Road

35.11 Trainmen who have been on duty eleven hours will be entitled to eight hours rest by giving the Dispatcher at least 1 hour's notice, the same to be granted by the dispatcher as soon as it can be arranged without delaying other trains that meeting points have been arranged with, before notice of rest required had been given.

35.12 Trainmen will be automatically tied up for rest when trainmen with whom they are working book rest and shall not be entitled to compensation during rest period.

35.13 In the application of paragraph 35.11 and 35.12, the rest period shall commence at the time men are tied up in instances when the dispatcher has been given notice of rest desired and, in order to provide accommodation, the men are instructed to take their rest prior to the expiration of eleven hours on duty.

Extract from:

MEMORANDUM OF AGREEMENT

Dated

MONTREAL, QUEBEC, JANUARY 8, 1986

Between

CANADIAN NATIONAL RAILWAY COMPANY

And

UNITED TRANSPORTATION UNION

Concerning Revisions to Agreement 4.3

ARTICLE 35

Booking Rest at Terminals

35.8 *Effective February 11, 1986*, revise paragraph 35.8 to read:

35.8 When traffic would be delayed through a shortage of trainmen, a trainman will be required to leave his home terminal after 16 hours rest.

35. *Effective February 11, 1986*, delete paragraphs 35.11 to 35.13, inclusive, including the sub-title "On The Road" immediately preceding paragraph 35.11, and substitute the following as paragraphs 35.11 to 35.17, inclusive.

Rest Enroute General

35.11 Trainmen who have been on duty 11 hours or more (10 hours or more, when operating with a reduced freight crew consist) will have the right to book rest enroute, if they so desire, in accordance with the provisions of paragraphs 35.11 to 35.17 of this Article. Trainmen are to be the judges of their own condition.

NOTE: Enroute may also include the initial or final terminal.

Notice

35.12 (a) Not less than 3 hours notification of the desire to book rest will be given to the Train Dispatcher. Such notification shall include the number of hours rest required.

(b) When proper notification of the desire to book rest has been given, and the Train Dispatcher orders the discontinuance of all work enroute, the train may, at the Trainmen's option, be taken through to the objective terminal or location where relief can be provided.

(c) When proper notification of the desire to book rest is given, the Company will communicate the necessary information, including the discontinuance of work enroute when applicable, to any other authority having responsibility over the train's run, such as the the proper supervisory officer at the objective terminal, other Train Dispatchers, etc.

Rest Period

35.13 (a) Trainmen may book a minimum of 4 and a maximum of 8 hours rest on the road. Rest booked must be in whole hours.

(b) When one member of the train crew books rest enroute, all other members of the train crew will be considered as on rest and automatically tied up. In such circumstances, Trainmen will not be considered as tied up between terminals and Article 35A shall not apply.

(c) When the Locomotive Engineer books rest enroute, Trainmen will, if they require rest, book rest at the same time. If rest is not required at that time, Trainmen will complete the tour of duty.

(d) When rest is booked, the maximum number of hours rest booked by any one member of the train or engine crew shall be the number of hours rest for all other members of the train and engine crew.

(e) Except as provided by sub-paragraph 35.15 (b) of this Article, when rest is booked, the rest period shall commence at the time all members of the train and engine crew go off duty.

(f) All time off duty for rest shall be deducted in computing time for the continuous trip.

Arrangements

35.14 (a) When rest is booked enroute, Trainmen will, at the Company's option:

(i) be relieved of duty and provided with accommodations either in a Company facility or an available hotel or motel; or

(ii) be replaced and deadheaded immediately either to the point for which ordered or to the home terminal where they will be relieved of duty.

NOTE (1): When deadheaded in the application of sub-paragraph 35.14 (a)(ii), Trainmen will be compensated on a continuous time basis for service and deadheading (miles or hours whichever is the greater) as per class of service.

NOTE (2): In the application of sub-paragraph 35.14 (a)(ii), Trainmen who are returned to the home terminal after being replaced on a trip to the away-from-home terminal will be paid, in addition to the earnings specified in Note (1) above, the additional actual road miles they would have otherwise earned for the round trip had they not been replaced.

(b) Except in circumstances beyond the Company's control, such as a accident, impassable track, equiped malfunction, plant failure, etc., Trainmen will be relieved of duty by the time rest booked is due to commence.

(c) Trainmen taking rest enroute under the provisions of this Article will first arrange to clear trains which would otherwise be unable to proceed. This shall not be used as a means of relief from the requirement to have Trainmen relieved of duty in accordance with the provisions of sub-paragraph 35.14 (b).

(d) Trainmen arriving at the objective terminal at the time rest booked is due to commence will, upon request, be relieved when there are yard assigments on duty.

Accommodations Enroute

35.15 (a) When accommodations are to be provided enroute, the Train Dispatcher may instruct Trainmen to take rest prior to the expiration of the 10th hour on duty or the 11th hour on duty, as the case may be, so that accommodations can be readily provided. In such circumstances, Trainmen will not be considered as tied up between terminals and Arcticle 35A shall not apply.

(b) Where accommodations are unavailable at the location where the crew ties-up or is relieved, the Trainmen will be transported to a location where accommodations are available. In such cases, the rest period will commence at the time accommodations are reached. If, in the application of this sub-paragraph 35.15 (b), this results in Trainmen being on duty beyond the time rest booked is due to commence, they will be paid for such extra time on a minute basis (each 4.8 minutes to count as one mile), with a minimum of 12-½ miles for each hour or portion thereof, at the rate applicable to the service performed on the tour of duty, until such time as accommodations are reached. In the application of this sub-paragraph 35.15 (b), time occupied in travelling between locations shall not be considered deadheading, nor shall miles travelled be paid for.

35.16 (a) When accommodations are to be provided enroute, such quarters shall be clean and sanitary. When available at the location, single room accupancy shall be provided. In determining the facilities where Trainmen are to be accommodated, preference will be given to accommodations where eating facilities are available; when not available, the Company will provide, arrange, or reimburse the Trainmen for transportation to an eating facility at that location. Claims for authorized transportation expenses must be submitted on CN Form 3140B accompanied by receipts.

(b) When accommodations are provided enroute, Trainmen will be provided an allowance of $8.50 where meals are not provided by the Company or at Company expense.

Resuming Duty

35.17 (a) When accommodations are provided enroute and the train does not proceed, Trainmen will resume duty when the rest period has expired and will handle the train to the objective terminal.

(b) When accommodations are provided enroute and the train proceeds without them, Trainmen will resume duty when the rest period has expired and will be deadheaded as soon as possible to the point for which ordered, or to the home terminal, at the option of the Company.

NOTE (1): When deadheaded in the application of sub-paragraph 35.17 (b), Trainmen will be compensated on a continuous time basis for service and deadheading (miles or hours whichever is the greater) as per class of service.

NOTE (2): In the application of sub-paragraph 35.17 (b), Trainmen who are returned to the home terminal when their train has proceeded to the away-from-home terminal without them, will be paid, in addition to the earnings specified in Note (1) above, the additional actual road miles they would otherwise have earned for the round trip had the train not proceeded without them.

35. Effective January 1, 1987, delete Article 35 in its entirety, including the title, and substitute the following as Article 35.

Booking Rest

At Terminals

35.1 A Trainman on arrival at terminals will not be called for immediate duty if he wants rest. Trainman will be judge of his own condition.

35.2 Required rest must be booked in whole hours on train register on arrival and will be given complete before being called. Rest may be booked by telephone where men are released from duty at points other than where the train register is located.

35.3 At the home terminal a Trainman will not be permitted to book less than 3 hours rest nor more than 24 hours rest.

35.4 At away-from-home terminals a Trainman will not be permitted to book less than 3 hours rest nor more than 8 hours rest. However, a Trainman on a train performing "grain block work" in excess of 4 hours enroute will be permitted to book not more than 12 hours rest.

35.5 When a Trainman books rest of not more than 16 hours at the home terminal or not more than 8 hours at the away-from-home terminal, his crew will not be sent out until the rest period has expired.

35.6 When all members of a crew have rest booked in excess of 16 hours, the crew will not be sent out until the rest period has expired.

35.7 In the application of this Article, the rest period will commence from the time the last man is off duty, if the expiry time of his rest booked exceeds the rest booked by other members of the crew.

35.8 Rest booked to be exclusive of call time.

35.9 The provisions of paragraphs 35.1 to 35.8, inclusive, will apply to a man on a Joint Spare Board upon completion of a tour of duty in road service.

Rest Enroute General

35.10 Trainmen who have been on duty 11 hours or more (10 hours or more, when operating with a reduced freight crew consist) will have the right to book rest enroute, if they so desire, in accordance with the provisions of paragraphs 35.10 to 35.16 of this Article. Trainmen are to be the judges of their own condition.

NOTE: Enroute may also include the initial or final terminal.

Notice

35.11 (a) Not less than 3 hours notification of the desire to book rest will be given to the Train Dispatcher. Such notification shall include the number of hours rest required.

(b) When proper notification of the desire to book rest has been given, and the Train Dispatcher orders the discontinuance of all work enroute, the train may, at the Trainmen's option, be taken through to the objective terminal or location where relief can be provided.

(c) When proper notification of the desire to book rest is given, the Company will communicate the necessary information, including the discontinuance of work enroute when applicable, to any other authority having responsibility over the train's run, such as the proper supervisory officer at the objective terminal, other Train Dispatchers, etc.

Rest Period

35.12 (a) Trainmen may book a minimum of 4 and a maximum of 8 hours rest on the road. Rest booked must be in whole hours.

(b) When one member of the train crew books rest enroute, all other members of the train crew will be considered as on rest and automatically tied up. In such circumstances, Trainmen will not be considered as tied up between terminals and Article 35A shall not apply.

(c) When the Locomotive Engineer books rest enroute, Trainmen will, if they require rest, book rest at the same time. If rest is not required at that time, Trainmen will complete the tour of duty.

(d) When rest is booked, the maximum number of hours rest booked by any one member of the train or engine crew shall be the number of hours rest for all other members of the train and engine crew.

(e) Except as provided by sub-paragraph 35.14 (b) of this Article, when rest is booked, the rest period shall commence at the time all members of the train and engine crew go off duty.

(f) All time off duty for rest shall be deducted in computing time for the continuous trip.

Arrangements

35.13 (a) When rest is booked enroute, Trainmen will, at the Company's option:

(i) be relieved of duty and provided with accommodations either in a Company facility or an available hotel or motel; or

(ii) be replaced and deadheaded immediately either to the point for which ordered or to the home terminal where they will be relieved of duty.

NOTE (1): When deadheaded in the application of sub-paragraph 35.13 (a)(ii), Trainmen will be compensated on a continuous time basis for service and deadheading (miles or hours whichever is the greater) as per class of service.

NOTE (2): In the application of sub-paragraph 35.13 (a)(ii), Trainmen who are returned to the home terminal after being replaced on a trip to the away-from-home terminal will be paid, in addition to the earnings specified in Note (1) above, the additional actual road miles they would have otherwise earned for the round trip had they not been replaced.

(b) Except in circumstances beyond the Company's control, such as accident, impassable track, equipment malfunction, plant failure, etc., Trainmen will be relieved of duty by the time rest booked is due to commence.

(c) Trainmen taking rest enroute under the provisions of this Article will first arrange to clear trains which would otherwise be unable to proceed. This shall not be used as a means of relief from the requirement to have Trainmen relieved of duty in accordance with the provisions of sub-paragraph 35.13 (b).

(d) Trainmen arriving at the objective terminal at the time rest booked is due to commence will, upon request, be relieved when there are yard assignments on duty.

Accommodations Enroute

35.14 (a) When accommodations are to be provided enroute, the Train Dispatcher may instruct Trainmen to take rest prior to the expiration of the 10th hour on duty or the 11th hour on duty, as the case may be, so that accommodations can be readily provided. In such circumstances, Trainmen will not be considered as tied up between terminals and Article 35A shall not apply.

(b) Where accommodations are unavailable at the location where the crew ties-up or is relieved, the Trainmen will be transported to a location where accommodations are available. In such cases, the rest period will commence at the time accommodations are reached. If, in the application of this sub-paragraph 35.14 (b), this results in Trainmen being on duty beyond the time rest booked is due to commence, they will be paid for such extra time on a minute basis (each 4.8 minutes to count as one mile), with a minimum of 12-½ miles for each hour or portion thereof, at the rate applicable to the service performed on the tour of duty, until such time as accommodations are reached. In the application of this sub-paragraph 35.14 (b), time occupied in travelling between locations shall not be considered deadheading, nor shall miles travelled be paid for.

35.15 (a) When accommodations are to be provided enroute, such quarters shall be clean and sanitary. When available at the location, single room occupancy shall be provided. In determining the facilities where Trainmen are to be accommodated, preference will be given to accommodations where eating facilities are available; when not available, the Company will provide, arrange, or reimburse the Trainmen for transportation to an eating facility at that location. Claims for authorized transportation expenses must be submitted on CN Form 3140B accompanied by receipts.

(b) When accommodations are provided enroute, Trainmen will be provided an allowance of $8.50 where meals are not provided by the Company or at Company expense.

Resuming Duty

35.16 (a) When accommodations are provided enroute and the train does not proceed, Trainmen will resume duty when the rest period has expired and will handle the train to the objective terminal.

(b) When accommodations are provided enroute and the train proceeds without them, Trainmen will resume duty when the rest period has expired and will be deadheaded as soon as possible to the point for which ordered, or to the home terminal, at the option of the Company.

NOTE (1): When deadheaded in the application of sub-paragraph 35.16 (b), Trainmen will be compensated on a continuous time basis for service and deadheading (miles or hours whichever is the greater) as per class of service.

NOTE (2): In the application of sub-paragraph 35.16 (b), Trainmen who are returned to the home terminal when their train has proceeded to the away-from-home terminal without them, will be paid, in addition to the earnings specified in Note (1) above, the additional actual road miles they would otherwise have earned for the round trip had the train not proceeded with them.

Extract from:

AGREEMENT 1.2

Between

CANADIAN NATIONAL RAILWAY COMPANY

And

BROTHERHOOD OF LOCOMOTIVE ENGINEERS

Governing

The Services of
Locomotive Engineers
Prairie and Mountain Regions

ARTICLE 28
Rest

At Terminals

28.1 Locomotive engineers will not be required to leave the home terminal until they have had at least 8 hours rest and at other terminal until they have had 6 hours rest if desired. Locomotive engineers will not be permitted to book less than 6 hours rest at the home terminal and 1 hour rest at other terminals. If rest is desired it must be entered when booking in on register, must be in whole hours and may not be changed or cancelled. Rest booked to be exclusive of call time.

28.2 When traffic would be delayed through a shortage of locomotive engineers with rest booked in excess of 8 hours at a home terminal or 6 hours at other terminals, locomotive engineers may be requested to accept a call at the expiration of the 8 hours or 6 hours.

NOTE: A locomotive engineer regularly assigned to work train service who books not more than 8 hours rest at a home terminal and not more than 6 hours rest at other terminals and the time of reporting for duty for the next tour of duty on his assignment is prior to the expiration of period off duty for rest, thereby causing him to lose a tour of duty on his assignment, shall be paid a basic day at the minimum rate applicable to the assignment less any amount earned or payment received under other agreement provisions for each tour of duty lost on his assgnment provided, that the locomotive engineer filling the vacancy was required to report for duty within 8 or 6 hours as the case may be, from the time the regularly assigned locomotive engineer booked off duty for rest.

28.3 Locomotive engineers will not be permitted to book more than 24 hours rest. Spare locomotive engineers who book more than 16 hours rest will have their names placed at the bottom of the working list after the period of rest booked has expired. When a pool locomotive engineer books more than 16 hours rest and being required before his rest is up, a spare locomotive engineer will be used in his place and the man booking rest will be placed at bottom of pool board when his rest is up.

NOTE: Upon written request from the local chairman of the Brotherhood to the appropriate officer of the Company, the last sentence of paragraph 28.3 will be waived at a particular terminal and arrangements will be made to provide that locomotive engineers assigned to pool service who book rest in excess of 16 hours will not have their turn placed on the working board until the expiration of their rest, at which time their turn will be placed at the bottom of the working board. In the application of this Note, locomotive engineers will not be permitted to book more than 24 hours rest.

On the Road

28.4 Locomotive engineers may book rest after 11 or more hours on duty by giving the Dispatcher at least 2 hours notice along with the number of hours rest desired. However, Locomotive Engineers in freight service working with less than a three-man train crew will not be treated differently than other crew members with respect to the minimum on duty requirement will be ten hours. If Dispatcher will provide a satisfactory run to the destination point, arrangements may be made to continue trip. The locomotive engineer to be the judge of his own conditions. When rest is taken enroute and the train does not proceed, the maximum period off duty for rest will be 8 hours.

28.5 In instances where rest is taken the Company will provide the necessary accommodation. Consideration will also be given to the availability of eating facilities when this is desired by the locomotive engineer booking rest.

(a) A locomotive engineer may be required to take rest desired prior to the expiration of 11 hours on duty to enable the Company to provide accommodation or to ensure that other trains can proceed. In these circumstances, a locomotive engineer will not be considered tied up between terminals under the provisions of Article 29.

(b) In circumstances where proper notice of rest desired has been given and 11 hours on duty have expired and sleeping accommodation cannot be provided or eating facilities are not available, the locomotive engineer, if relief is not provided, will be run to a point where sleeping and eating facilities are available or to the point of destination either light engine or caboose hop.

(c) When rest is taken en route and the train does not proceed, the locomotive engineer will be provided an allowance of $8.00 where meals are not provided by the Company or at Company expense.

28.6 Locomotive engineers taking rest en route will first arrange to clear trains which would otherwise be unable to proceed against their train.

28.7 Locomotive engineers who are replaced will be instructed to deadhead to point to which ordered or to home station immediately and will be compensated on a continuous time basis for service and deadheading as per class of locomotive and service.

28.8 Where relief locomotive engineer is not furnished and the engine is tied up, the time off duty for rest will be deducted in computing time for the continuous trip.

28.9 When rest is taken en route locomotive engineers will resume duty at the expiration of the rest period. Maximum period off duty for rest will be 8 hours.

Extract from:

MEMORANDUM OF AGREEMENT

Dated

MONTREAL, QUEBEC, JANUARY 8, 1986

Between

CANADIAN NATIONAL RAILWAY COMPANY

And

BROTHERHOOD OF LOCOMOTIVE ENGINEERS

Concerning Revisions to Agreement 1.2

ARTICLE 28

Rest

28. *Effective February 11, 1986*, delete Article 28 in its entirety and substitute the following as Article 28:

At Terminals

28.1 Locomotive engineers will have the right, upon going off duty, to take between 6 and 24 hours' rest at the home terminal.

28.2 Locomotive engineers will have the right, upon going off duty, to take between 1 and 8 hours' rest at the away-from-home terminal. However, a locomotive engineer on a train performing "grain block work" is excess of 4 hours enroute will be permitted to book not more than 12 hours rest.

28.3 Rest taken pursuant to paragraph 28.1 or paragraph 28.2 must be registered in even hours and once registered cannot be changed or cancelled. Rest taken will be exclusive of call time.

NOTE: A locomotive engineer regularly assigned to work train service who books not more than 8 hours rest at a home terminal and not more than 6 hours rest at other terminals and the time of reporting for duty for the next tour of duty on his assignment is prior to the expiration of period off duty for rest, thereby causing him to lose a tour of duty on his assignment, shall be paid a basic day at the minimum rate applicable to the assignment less any amount earned or payment received under other agreement provisions for each tour of duty lost on his assignment provided, that the locomotive engineer filling the vacancy was required to report for duty within 8 or 6 hours as the case may be, from the time the regularly assigned locomotive engineer booked off duty for rest.

28.4 Locomotive engineers will not be permitted to book more than 24 hours rest at the home terminal. Spare locomotive engineers who book more than 16 hours rest will have their names placed at the bottom of the working list after the period of rest booked has expired. When a pool locomotive engineer books more than 16 hours rest and being required before his rest is up, a spare locomotive engineer will be used in his place and the man booking rest will be placed at bottom of pool board when his rest is up.

NOTE: Upon written request from the local chairman of the Brotherhood to the appropriate officer of the Company, the last sentence of paragraph 28.3 will be waived at a particular terminal and arrangements will be made to provide that locomotive engineers assigned to pool service who book rest in excess of 16 hours will not have their turn placed on the working board until the expiration of their rest, at which time their turn will be placed at the bottom of the working board. In the application of this Note, locomotive engineers will not be permitted to book more than 24 hours rest.

Booking Rest Enroute

General

28.5 Locomotive engineers who have been on duty 11 hours or more (10 hours or more, when operating with a reduced freight crew consist) will have the right to

book rest enroute, if they so desire, in accordance with the provisions of paragraphs 28.5 to 28.11 of this Article. Locomotive engineers are to be the judges of their own condition.

NOTE: Enroute may also include the initial or final terminal.

Notice

28.6 (a) Not less than 3 hours notification of the desire to book rest will be given to the train dispatcher. Such notification shall include the number of hours rest required.

(b) When proper notification of the desire to book rest has been given, and the train dispatcher orders the discontinuance of all work enroute, the train may, at the locomotive engineer's option, be taken through to the objective terminal or location where relief can be provided.

(c) When proper notification of the desire to book rest is given, the Company will communicate the necessary information, including the discontinuance of work enroute when applicable, to any other authority having responsibility over the train's run, such as the proper supervisory officer at the objective terminal, other train dispatchers, etc.

Rest Period

28.7 (a) Locomotive engineers may book a minimum of 4 and a maximum of 8 hours rest on the road. Rest booked must be in whole hours.

(b) When one or more members of the train or engine crew books rest enroute, the locomotive engineer will, if he requires rest, take the rest at the same time. If rest is not required at that time, the locomotive engineer will complete the tour of duty.

(c) When rest is booked, the maximum number of hours rest booked by any one member of the train or engine crew shall be the number of hours rest for all other members of the train and engine crew.

(d) Except as provided by sub-paragraph 28.9 (b) of this Article, when rest is booked, the rest period shall commence at the time all members of the train and engine crew go off duty.

(e) All time off duty for rest shall be deducted in computing time for the continuous trip.

Arrangements

28.8 (a) When rest is booked enroute, locomotive engineers will, at the Company's option:

(i) be relieved of duty and provided with accommodations either in a Company facility or an available hotel or motel; or

(ii) be replaced and deadheaded immediately either to the point for which ordered or to the home terminal where they will be relieved of duty.

NOTE (1): When deadheaded in the application of sub-paragraph 28.8 (a)(ii), locomotive engineers will be compensated on a continuous time basis for service and deadheading (miles or hours whichever is the greater) as per class of service.

NOTE (2): In the application of sub-paragraph 28.8 (a)(ii), locomotive engineers who are returned to the home terminal after being replaced on a trip to the away-from-home terminal will be paid, in addition to the earnings specified in Note (1) above, the additional actual road miles they would have otherwise earned for the round trip had they not been replaced.

(b) Except in circumstances beyond the Company's control, such as accident, impassable track, equipment malfunction, plant failure, etc., locomotive engineers will be relieved of duty by the time rest booked is due to commence.

(c) Locomotive engineers taking rest enroute under the provisions of this Article will first arrange to clear trains which would otherwise be unable to proceed. This shall not be used as a means of relief from the requirement to have locomotive engineers relieved of duty in accordance with the provisions of sub-paragraph 29.8 (b).

(d) Locomotive engineers arriving at the objective terminal at the time rest booked is due to commence will, upon request, be relieved when there are yard assignments on duty.

Accommodations Enroute

28.9 (a) When accommodations are to be provided enroute, the train dispatcher may instruct locomotive engineers to take rest prior to the expiration of the 10th hour on duty or the 11th hour on duty, as the case may be, so that accommodations can be readily provided. In such circumstances, locomotive engineers will not be considered as tied up between terminals and Article 29 shall not apply.

(b) Where accommodations are unavailable at the location where the crew ties-up or is relieved, the locomotive engineer will be transported to a location where accommodations are available. In such cases, the rest period will commence at the time accommodations are reached. If, in the application of this sub-paragraph 28.9 (b), this results in the locomotive engineer being on duty beyond the time rest booked is due to commence, he will be paid for such extra time on a minute basis (each 4.8 minutes to count as one mile), with a minimum of 12-½ miles for each hour or portion thereof, at the rate applicable to the service performed on the tour of duty, until such time as accommodations are reached. In the application of this sub-paragraph 28.9 (b), time occupied in travelling between locations shall not be considered deadheading, nor shall miles travelled be paid for.

28.10 (a) When accommodations are to be provided enroute, such quarters shall be clean and sanitary. When available at the location, single room occupancy shall be provided. In determining the facilities where locomotive engineers are to be accommodated, preference will be given to accommodations where eating facilities are available; when not available, the Company will provide, arrange, or reimburse the locomotive engineer for transportation to an eating facility at that

location. Claims for authorized transportation expenses must be submitted on CN Form 3140B accompanied by receipts.

(b) When accommodations are provided enroute, locomotive engineers will be provided an allowance of $8.50 where meals are not provided by the Company or at Company expense.

Resuming Duty

28.11 (a) When accommodations are provided enroute and the train does not proceed, the locomotive engineer will resume duty when the rest period has expired and will handle the train to the objective terminal.

(b) When accommodations are provided enroute and the train proceeds without him, the locomotive engineer will resume duty when the rest period has expired and will be deadheaded as soon as possible to the point for which ordered, or to the home terminal, at the option of the Company.

NOTE (1): When deadheaded in the application of sub-paragraph 28.11 (b), locomotive engineers will be compensated on a continuous time basis for service and deadheading (miles or hours whichever is the greater) as per class of service.

NOTE (2): In the application of sub-paragraph 28.11 (b), locomotive engineers who are returned to the home terminal when their train has proceeded to the away-from-home terminal without them, will be paid, in addition to the earnings specified in Note (1) above, the additional actual road miles they would otherwise have earned for the round trip had the train not proceeded without them.

APPENDIX 6
COMMISSION OF INQUIRY
HINTON TRAIN COLLISION

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